



CITY OF ATLANTA

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DEPARTMENT OF PROCUREMENT
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
asmith@atlantaga.gov

Kasim Reed
Mayor

June 12, 2015

INTERESTED BIDDER:

**Re: FC-8075, F3 A380 Reconfiguration at Hartsfield-Jackson
Atlanta International Airport**

Attached is one (1) copy of **Addendum No. 4**, which is hereby made a part of the above-referenced project.

For additional information, please contact the following personnel for the respective solicitation: FC-8075, Kiondria Walker, Contracting Officer, at (404) 330-6654, or via email at kmwalker@atlantaga.gov.

Sincerely,

A handwritten signature in cursive script that reads "Adam L. Smith".
Adam L. Smith

ALS:kaw

Addendum No. 4

Re: FC-8075, F3 A380 Reconfiguration at Hartsfield-Jackson Atlanta International Airport

June 12, 2015

Page 2

This Addendum forms a part of the Invitation to Bid and modifies the original solicitation package as noted below:

- Answers questions received from prospective bidders and modifies the Invitation to Bid as described in the attached documents.

.....

Bids are now due **Wednesday, July 8, 2015**, and should be time stamped no later than 2:00 p.m. EST on this day, and delivered to the address below:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, S.W.
City Hall South, Suite 1900
Atlanta, Georgia 30303

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*****All other information remains unchanged*****

Addendum No. 4

**Re: FC-8075, F3 A380 Reconfiguration at Hartsfield- Jackson Atlanta
International Airport**

June 12, 2015

Page 3

Acknowledgement of Addendum No. 4

Bidders must sign below and return this form with its proposal to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303 as acknowledgement of receipt of this addendum on this _____ day of _____, 2015.

Legal Company Name of Respondent

Signature of Authorized Representative

Title

Date

**MODIFICATIONS ARE INDICATED IN BOLD ITALIC FACE TYPE
PROJECT NUMBER FC-8075 – F3 A380 RECONFIGURATION**

The following questions and/or clarifications were requested by various Contractors:

1. Question: We kindly request that we be added as an "Approved Manufacturer" for the Passenger Boarding Bridges & fixed walkway systems as required for a complete system for the upcoming Gate F3 Reconfiguration project at the Hartsfield-Jackson Atlanta International Airport?

Answer: *The approved manufacturer for the Passenger Boarding Bridge & Fixed Walking System is identified in Part II of the RFP, Exhibit E, Scope of Work and Technical Specifications, Section 347713 of the Project Manual. Other manufacturers will not be added.*

2. Question: Can ITW GSE be added as an approved vendor?

Answer: *No*

3. Question: Please provide Layout Drawing Sheet Number C201 in CAD (.dwg format) for our analysis.

Answer: *No, we don't supply CAD Drawings.*

4. Question: Please provide the Apron Elevation at the Rotunda of Gate F3A.

Answer: *The apron elevation at the rotunda shall be interpolated from the elevations shown on Sheet C105A. The Contractor is responsible for making adjustments as required to accommodate field conditions.*

5. Question: We kindly request our Microwave collision avoidance system?

Answer: *See question #1.*

6. Question: Is the existing Jetway Passenger Boarding Bridge at Gate F3 still under Warranty?

Answer: *No*

7. Question: If the existing Jetway Passenger Boarding Bridge at Gate F3 is no longer under warrant can the schematics be provided to us in order to link the Collision Avoidance Systems between Gate 3 and Gate F3A?

Answer: *Yes, after the Notice to Proceed.*

8. Question: We kindly request exception and clarification of which "B" or "C" TKAS standard interior tunnel dimension will be required on the Gate F3A

project.

Answer: *See question #1.*

9. Question We kindly request allowance of our standard solid tires.

Answer *Solid tires with a suitable wearing surface are required per Part II of the RFP, Exhibit E, Scope of Work and Technical Specifications, Section 347713, Part 2.04.H.4.*

10. Question Because our bridges are certified by an independent testing laboratory, request that this certification serves as an equivalent to a PE stamp.

Answer *No, the PE stamp must be supplied as required in the Agreement, contained in Part II of the RFP.*

11. Question TKAS kindly requests exception and that the signed and sealed professional Engineering Drawings be stamped in the state of Texas where the equipment is manufactured.

Answer *No, the signed and sealed professional Engineer Drawings must be stamped in the state of Georgia as required in the Agreement, contained in Part II of the RFP.*

12. Question We kindly request that we be added as an "Approved Manufacturer" for the Gate Monitoring System for the upcoming Gate F3A Reconfiguration project at the Hartsfield-Jackson Atlanta International Airport

Answer *No, must be per Specification, Section 275900 – Gate Monitoring System.*

13. Question We kindly request that we be added as an "Approved Manufacturer" for the Passenger Boarding Bridges & fixed walkway systems as required for a complete system for the upcoming Gate F3 Reconfiguration project at the Hartsfield-Jackson Atlanta International Airport?

Answer *See question #1.*

14. Question We kindly request acceptance of our standard PLC.

Answer *See question #1.*

15. Question I am requesting the geotechnical report mentioned on Sheet S001

Answer *The report is available in plan room.*

16. Question Is there a list of prequalified General Contractors? If so, please provide.

Answer *No, but refer to Part 1, Section 3 of the Information and Instruction to Bidders*

for minimum qualifications for General Contractors.

17. Question Is there a list of prequalified Subcontractors? If so, please provide.
- Answer No, but refer to Part 1, Section 3 for minimum qualification for Subcontractors.***
18. Question Are you going to accept direct bids on the PCA or do I have to go through the Bridge Manufacturer?
- Answer Direct bids on PCA equipment will not be accepted.***
19. Question It appears that the bridge model is larger than required, is the AT3 68/144 the model size desired?
- Answer We could not locate any references to the AT3 68/144 in the specifications or drawings. The schedule on Drawing C204 indicates the required operational limits which is a shorter PBB than indicated by the question.***
20. Question The skewed walkway puts the rotunda in a position that is within a degree or two of full rotation when servicing the aircraft. This creates a situation should the aircraft be miss-parked where the bridge cannot reach the aircraft. Can the rotunda location be moved?
- Answer The door opening at the building/FWW is being revised via this addendum, which will affect the alignment of the FWW. A benefit of the door relocation is that the miss-park tolerance will be increased to just over 7 feet which is sufficient. The rotunda location does not require relocation.***
- We moved the door assembly 1'-3" south to center the heavy jet way connection frame on the adjacent column line 4.2. A positive 90deg stop will be required for the door to prevent damage to either the door or column finish surfaces. Curtain wall mullion placement on the East façade has shifted to accommodate but overall areas have not changed.***
- The revised drawing, complying with above, will be issued in the conformed, Issued for Construction set.***
21. Question The walkway size is shown in two different sizes, on the drawing it scales to approximately 6' outside dimensions, in the specification it asks for minimum interior dimensions of 6'-10" and handrail to handrail of 6'-3". Given the skewed configuration of the walkway it appears a wider walkway is detrimental to the layout and desire to slope the walkway. Can the walkway be reduced to corridor width, 4'-4" to allow maximum slope? The entry into the rotunda is 4'-4" so the wider walkway for the short distance is not as beneficial. Please advise?
- Answer Reduced size walkway width of 4' 4" is not acceptable. To match walkway size shown on drawings, Specification 347713, Part 2.06.C.2.b shall be revised to read:***

"Minimum Clear Width: 5 feet – 10 inches."

22. Question 2.06.B.1.c, states the Minimum Transition Ramp Width: 4 feet-8 inches, our transition ramp width for the A to B is 4' 5 ½". Please accept these standard widths.

***Answer Manufacturer's standard ramp width of 4' 5 ½" is acceptable. Specification 347713, Part 2.06.B.1.c shall be revised to read:
"Minimum Transition Ramp Width: 4 feet 5-1/2 inches."***

23. Question 2.06.J.2.d and 2.06.J.2.F, require all passenger boarding bridge motion controls shall be the momentary contact (deadman) type. All motion controls shall be located to be relative to the function of the passenger boarding bridge being controlled (i.e., with raise and lower functions, the "RAISE" push button will be located above the "LOWER" push button). The control console includes the following control switches and indications.

The existing bridges have touchscreen HMI's. Can we supply the same configuration?

***Answer PBB motion controls shall not be by touchscreen. HMI user interface for accessory control, alarms, diagnostics and limits is acceptable per the specification. Section 347713, Part 2.06.J.2.c. For clarification Part 2.06.J.2.d. last sentence shall be revised to read:
"The control console includes the following control switches and/or touchscreen indications for the following:"***

24. Question 2.06.J.5.c, calls for proximity limit switches to control oversteer of drive wheels.

Our wheel assembly has a mechanical stop that prevents an oversteer condition. We control the wheel travel through sensor and software. The mechanical stops are the backup of the system. Please allow our standard design that does not need the proximity sensors.

Answer Ultimate limit switches shall be mechanical stop type. Manufacturer's standard sensor and software for control of wheel travel is acceptable. For clarification specification 347713, Part 2.06.J.5.c shall be revised to read: " Drive wheel: Provide mechanical stop to control oversteer of drive wheels."

25. Question 2.06.J.5.d, calls for the rotunda to be supplied with two double throw, double action adjustable limit switches in each direction to control the traversable area of the bridge.

Our design only uses one limit switch for ultimate rotational limit. We use electro- mechanical switches. The swing limits are controlled by a sensor and software. Please allow our standard.

Answer *Ultimate stop shall be by limit switch which shuts power off to the bridge. Normal operating swing limits may be controlled by sensor and software with alarm and limit of travel when swing limits reached.*

26. Question 2.06.M.2, calls for the interior lighting to be located on eight foot centers. Due to the structural design of our roof, our lighting is on 12 foot centers. We can meet the required lighting levels of 28 foot candles. Please allow our standard.

Answer *Manufacturer's standard light spacing is acceptable if the 28-foot candles illumination level is met.*

27. Question 2.06.A.2.c; 2.06.E.2; 2.10.F calls for the Rotunda and Cab side curtains to be aluminum and in a another area calls for the Rotunda and Cab curtains to be galvanized. Our standard curtain is galvanized. Is this acceptable?

Answer *Rotunda and cab side curtains shall be aluminum to match existing installations on this concourse.*

28. Question 2.10.B, Exterior Paint System, this section calls for a three coat process with the two top coats being polyurethane. Our standard is a two coat system that achieves the 9 mil minimum requirement. Is this acceptable?

Answer *Provide three coat exterior paint system as specified.*

29. Question 2.10.E.1 Exterior colors and finishes, the existing bridges are a single color. The specification indicates that there will be a two tone paint requirement. As there is a cost component to two tone paint, can you confirm if the two tone is required or will the paint scheme match the existing bridges?

Answer *The specification does not call for two tone paint. It calls for a custom color as selected by Architect (i.e., match the existing PBBs "Arctic White").*

30. Question 2.10.F.13.d calls for the transition ramps to be constructed of 1-1/8-inch marine grade plywood. Also the ramps are to be covered with 1/4-inch ribbed fire-resistant black rubber with anti-skid surface and yellow chamfered edge.

Our standard is steel and the ramp hinge system is a finger/ lot configuration. Our rubber flooring is 3/16 instead of 1/4 inch. Please accept our standard.

Answer *Manufacturer's standard steel transition ramp with 3/16 rubber flooring is acceptable.*

31. Question 3.04 calls for 40 hours of operator training. As this seems to be excessive, please

confirm that you would like 40 hours of operator training in addition to the 40 hours of maintenance training.

Answer *Section 347713, paragraph 3.04, A.2. shall be revised to read as follows: "Provide twelve (12) hours of operator and sixteen (16) hours of maintenance training by a qualified manufacturer's representative for the boarding bridges purchased under this Contract. Training shall be divided into five separate sessions."
Subparagraphs a., b., and c. of said paragraph are unchanged.*

32. Question 2.09.A.3, calls for a 28.5 VDC. As this bridge will service only mainline type aircraft do you want the 28.5 VDC unit included on this bridge?

Answer *The section is somewhat general in stating "The 400 Hz unit size will be rated at 180 kVA and combined with 28.5 Vdc Unit where indicated."
The 28.5 Vdc unit is not required or called for on this bridge. Refer to Section 26543 for 400 Hz ground power requirements.*

33. Question 263543, 400 Hz Ground Power Units

- A. 2.03.C calls for painted steel frame. Our equipment uses a painted aluminum frame. Please allow the aluminum frame.
- B. 2.03.D. calls for halogen free power cables. This is a European standard, not a US standard. Our cables meet the US standards. Please allow the US standard.
- C. 2.03.G.5 calls for an emergency stop. Do you want this on the unit that will be over 20' in the air when servicing the A380 U1 door?
- D. 2.03.L calls for data communications settable from the front panel. Our unit will communicate with the bridge PLC via Ethernet. The address of the 400 Hz unit is not settable with front panel controls but via a computer talking to the Ethernet module. Please accept this method.
- E. 2.03.M calls for fans which are temperature controlled. Our fans run whenever the power on button is activated, they are not temperature controlled.

Answer *A. Acceptable. Section 263543 paragraph 2.03, C. shall be revised to read as the following: "The GPU cubicle shall consist of a painted welded aluminum frame, providing support for the components / modules. The covers / doors shall be painted aluminum plates. Access to transformers / fans shall be via bolted covers. Access to zones containing electronic components shall be via hinged doors. Zones containing electronic components shall be completely sealed from the environment and from the forced cooled zones. Surface treatment shall be suitable for outdoor marine environment to ensure maximum surface protection."*

- B. *Acceptable. Section 263543 paragraph 2.03, D., the first sentence shall be revised to read as the following: "Power cables shall be high temperature (125°C)."*
- C. *Yes emergency stop is required on the unit. Additionally, a remote stop is required along with other controls on the PBB lift column as illustrated on sheet C205. Section 263543 paragraph 2.03, G.1. shall be revised to read as the following: Emergency Stop Button, Mushroom Type, Turn to Release. Provide additional remote emergency stop button on the PBB lift column along with other controls as illustrated on sheet C205.*
- D. *Acceptable. Section 263543 paragraph 2.03, L. shall be revised to read as follows: "The GPU shall be fitted with RS485 data communication port. The GPU shall have the ability to communicate via Ethernet and transmit data (including GPU status and operational/metering information) to a building management system. The unit shall have the ability to communicate directly with the passenger boarding bridge control system. Coordinate communication requirements with the passenger boarding bridge manufacturer."*
- E. *Acceptable. Section 263543 paragraph 2.03, M. shall be revised to read as following: "The GPU shall be equipped with fans that are easily accessible and changeable for service and maintenance."*

34. Question **263544, 400 Hz Cable and Hoist**

2.02.A. 400 Hz cable is specified to be a banded type of cable, but they also spec 2.99v drop at 260 amp load with only 0.2v unbalance. The banded cable cannot meet this. A jacketed cable is the only cable that will meet the voltage drop. Also, 60ft cables will be too short for the 400 Hz unit on the rear bridge. It is suggested that an 80ft cable be used on this bridge.

Answer *Revise cable to six around one cable with 6 each #4 AWG power conductors, 1 each #1 AWG neutral conductors and 6 x 3, #18 AWG control conductors. Class M, extra flexible stranding. Provide cable with lightweight polyethylene cover for abrasion protection. Provide 80ft cable. Section 263544 paragraph 2.02, A. shall be revised to read as the following:*
"Cables shall be banded type, 80 feet in length, suitable for nominal 115/200 Volt, 3-Phase, 4-Wire, 400 Hertz power. Cables shall be marked as required in Article 400-6 in compliance with the requirements of Article 300-11 which requires maximum rated voltage for which the conductor was listed, type of rating on insulation, the manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified, and the AWG size or

circular-mil area. The conductors shall be color coded to meet the requirements of Articles 400-22 and 400-23 of the NEC. Components shall be as follows: Six Around One Single Jacketed Cable Power Conductors: 6-#4 AWG Class M, Extra flexible stranding, Neutral Conductor: 1-#1 AWG Class M, Extra flexible stranding, Control Conductors: 6 x 3, #8 AWG, E and F interlock wires and control wires configured in a symmetrical layout to minimize inductive losses. Provide cable with lightweight polyethylene cover for abrasion protection. Voltage Rating: 600 VAC Ampacity: 260 amperes Frequency: 400 Hertz Voltage Drop: 2.99 Volts Measured at 90 KVA, 0.8 power factor on 80' cable Voltage Unbalance: 0.20 Volts Measured at 90 KVA, 0.8 power factor on 80' cable. Plug Section 1. Shall have a high visibility replacement contact section (nose) which allows for infield replacement in 3-5 minutes. 3. Molded tapered strain relief release at connector back. This release is required to accommodate the whipsaw action commonly used shall have a high visibility replacement contact section (nose) which when inserting and removing connectors from aircraft."

35. Question Who would we contact to get listed as an approved equal to the current specification for insulated metal panels. Currently, only one company is listed as the sole supplier and we have installers looking at the project who cannot bid it because Centria only sells to a select 2-3 dealers.

Would I need to contact this group that is listed on the plans?

Answer *No substitution allowed. Refer to spec Section 074216.*

THE FOLLOWING ARE CHANGES AND/OR MODIFICATIONS TO THE BID DOCUMENTS

1. REVISION TO PART 1; INFORMATION AND INSTRUCTIONS TO BIDDERS – 3. MINIMUM QUALIFICATIONS

Addition: *3.1 Each member of the Joint Venture participating in this procurement must have and submit a valid Georgia General Contractor's License with its Bid in full compliance with the Laws of the State of Georgia. Either all members of the Joint Venture or the Joint Venture as an entity must be qualified and licensed to operate in the business of General Contracting and submit a valid Georgia General Contractor's License with its bid.*

2. REVISION TO EXHIBIT "E" SCOPE OF WORK AND TECHNICAL SPECIFICATIONS=

Delete: Section 003132 - "Geotechnical Data", in its entirety.

Replace With: *Section 003132 -"Geotechnical Data", attached to this addendum No. 4.*

Delete: Section 263543 - "Ground Power Units (400Hz)", in its entirety.

Replace With: *Section 263543 -"Ground Power Units (400Hz)", attached to this addendum No. 4.*

Delete: Section 263544 - "Aircraft Ground Power Cable 400Hz and Hoist", in its entirety.

Replace With: *Section 263544 -"Aircraft Ground Power Cable 400Hz and Hoist", attached to this addendum No. 4.*

Delete: Section 347713 - "Passenger Boarding Bridge and Fixed Walkways", in its entirety.

Replace With: *Section 347713 -"Passenger Boarding Bridge and Fixed Walkways", attached to this addendum No. 4.*

Space holder for Pages 1 – 47 Revised Specifications

DOCUMENT 003132

GEOTECHNICAL DATA

1.01 GEOTECHNICAL DATA

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide City of Atlanta's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. Available soil-boring data for Project, obtained by City of Atlanta and additional Geotechnical Work by Willmer Engineering, is available for viewing at the Office of Procurement, City of Atlanta.
- C. Related Requirements:
 - 1. "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. "Existing Condition Information" for information about existing conditions that is made available to bidders.

END OF DOCUMENT 003132

SECTION 263543
GROUND POWER UNITS (400Hz)

PART 1-GENERAL

1.01 DESCRIPTION

- A. Solid State Frequency Converters: 60Hz to 400Hz AC. Converters shall be designed to be mounted on the underside of Passenger Boarding Bridge (PBB) cab, and kVA sized per Drawings.

1.02 APPLICABLE CODES AND STANDARDS

- A. The Ground Power Unit (GPU) manufacturer shall comply with the following norms and standards. Include UL-label and Certificate of Conformity.

MIL-704F	Aircraft electric power characteristics.
DFS 400	Specification for 400Hz aircraft power supply.
ISO 6858	Aircraft ground support electrical supplies.
EN 61000-6-4.....	Electromagnetic compatibility, Generic mission standard.
EN 61000-6-2.....	Electromagnetic compatibility, Generic immunity standard.
SAE ARP 5015.....	Ground equipment – 400Hz ground power performance requirement.
ISO-6858.....	Aircraft ground support electrical supplies.
NFPA 70.....	National Electrical Code.
UL-1012.....	Underwriter's Laboratory.

1.03 SUBMITTALS

- A. The Following Submittals shall be required:
 - 1. Manufacturer's Data.
 - 2. Connection Diagrams and Outline Drawings.
 - 3. Interconnection Schematics and Diagrams.
 - 4. Recommended Spare Parts List.
 - 5. List of required Special Tools.
 - 6. Operational and Maintenance Manuals.
 - 7. Test Reports.

PART 2 - PRODUCTS

Provide frequency converter consisting of modular construction solid-state components for 60Hz to 400Hz input/output devices and ancillary control devices. The frequency converter shall be the manufacturer's latest design that complies with the specification. Only PWM designs are acceptable; units designed with switching devices using Isolated Gate Bi-polar Transistors (IGBT) technology shall be used. No step conversion or Bi-polar transistor units shall be considered.

2.01 DESIGN REQUIREMENTS

- A. The solid state frequency converter shall be complete with components and accessories coordinated so that the complete unit shall function as specified, and shall be capable of continually running under full load conditions in accordance with the specification.

2.02 MANUFACTURER

- A. JBT Aerotech - Jet Power

2.03 PERFORMANCE

A. SUPPLY INPUT POWER

1. INPUT VOLTAGE: 460 VAC \pm 15%, 3 PH, 60HZ \pm 10Hz.
2. Indication and protection for incorrect phase rotation.
3. INRUSH CURRENT: Shall not exceed 100% of rated full load current.
4. LINE CURRENT DISTORTION: Shall not exceed 10% free mains voltage.
5. POWER FACTOR: From 50% to 100% rated load input, power factor shall be not less than 0.95.
6. POWER INTERRUPTION: Frequency Converter shall be designed to withstand a 20 msec power interruption without shutting the system down or affecting the output voltage.

B. ENVIRONMENTAL

All equipment provided must be capable of operating in the installed environment. The equipment shall be capable of operating in the following conditions without adverse effects:

1. Temperature: -10°C -40°C
2. Humidity : 0% to 100%
3. Precipitation: Rain, dust and wind combined
4. General: Glycol/Skydrol hydrocarbons from jet fumes

C. GPU CONSTRUCTION REQUIREMENTS

The GPU cubicle shall consist of a painted welded ~~steel~~ aluminum frame, providing support for the components / modules. The covers / doors shall be painted ~~steel~~ aluminum plates. Access to transformers / fans shall be via bolted covers. Access to zones containing electronic components shall be via hinged doors. Zones containing electronic components shall be completely sealed from the environment and from the forced cooled zones. Surface treatment shall be suitable for outdoor marine environment to ensure maximum surface protection.

D. WIRING

Power cables shall be high temperature (125°C) and halogen-free. Termination shall be with compression type cable lugs / bolts and secured with leaf springs. The minimum size of cables used within the unit shall be 1 mm with the exception of PCB and ribbon cables. Control terminals and small power terminals shall be of the clamp type capable of taking up to 4 mm flexible core. All cables shall be clearly marked near termination points at both ends, using an indelible method (e.g., slip-on type markers). Wrap-around adhesive markers shall not be accepted. The marking/numbering shall correspond with schematics / diagrams.

E. COMPONENTS

Standard components used in the GPU (breakers, terminals, etc.) shall be of well-known manufacture and high standard / quality.

F. DISPLAY

The display shall be alphanumeric and able to provide information at different levels. The levels shall be as follows:

1. Status of the converter, e.g., input voltage, output voltage, output current, and output frequency
2. Detailed alarm description in case of a fault and alarm historic.
3. The power consumption during operations
4. View and adjust parameters. Minimum setup parameters are output voltage, voltage compensation, time, interlock by-pass and fan test.

G. INDICATION

The unit shall be equipped with the following LED lamps and push-buttons:

1. Input Power Available
2. 400HZ ON
3. START/RESET
4. STOP
5. Emergency Stop Button, Mushroom Type, Turn to Release. **Provide additional remote emergency stop button on the PBB lift column along with other controls as illustrated on sheet C205.**
6. Lamp Test

H. INPUT/OUTPUT CABLE TERMINATION

This Section shall suit the entrance of both output and input cables. It must be large enough to provide easy access to terminate the power and control cables. Min. distance from 400Hz power cable entrance to terminals must be 400 mm. Min. distance from 60Hz mains cable entrance to terminals must be 400 mm. The input cable shall be connected to an input isolator inside the 400Hz converter.

I. 12-PULSE RECTIFICATION ON INPUT

To ensure low voltage distortion on the mains supply, the unit shall have, as standard, 12-pulse rectification. The input current harmonic distortion shall not exceed 10% when the converter is operating at full rated load.

J. INDIVIDUAL PHASE REGULATION ON OUTPUT

The GPU shall be designed with individual phase regulation to ensure balanced voltage at the aircraft plug.

K. DATA LOGGING

The GPU shall be equipped with a Self-Diagnostic system, where it is possible to log up to 50 errors.

L. DATA COMMUNICATION

The GPU shall be fitted with RS485 data communication port. The GPU shall have the ability to communicate via Ethernet and transmit data (including GPU status and operational/metering information) to a building management system. The unit shall have the ability to communicate directly with the passenger boarding bridge control system. Coordinate communication requirements with the passenger boarding bridge manufacturer. ~~It shall be possible to set up the protocol type and JBUS address number of the unit via the display / keyboard interface.~~

M. FANS

~~The GPU shall be equipped with fans that controlled by the temperature of the modules in the electronic zone. This allows the fans to run only when the "factory set" pre-determined temperature level is exceeded, thus reducing noise level and giving the fans an extended life time. During service or maintenance, the fan temperature control may be by-passed, to perform functionality test. Furthermore, it is a strict requirement that the fans are easily accessible and changeable for service and maintenance.~~

N. NBPT CAPABILITY

The GPU must have an active synchronization system to meet the demands of No Break Power Transfer, which a requirement for modern-day aircraft. The system shall be capable of synchronizing with phase displacement of up to 70°.

O. INTERLOCK SYSTEM

1. The GPU shall have an aircraft interlock system, which may be by-passed via the keyboard interface. When the plug is plugged into the aircraft, it must automatically return/default to normal mode.
2. See SECTION 347713 – PASSENGER BOARDING BRIDGES AND FIXED WALKWAYS for control wiring to interlock GPU with PBB for non-simultaneous operation. Provide interlock feature compatible with PBB.

P. ACTIVE HARMONIC ELIMINATION AT OUTPUT

To eliminate the harmonic distortion at the output, the GPU shall have an active regulation system to ensure that harmonic distortion is reduced to a minimum, thus ensuring good voltage quality (DF=2%). This is a requirement due to increasing non-linear loads in modern aircraft (e.g., the A380) (ref. ISO 1549).

Q. OPERATING EFFICIENCY

Overall Efficiency: Higher than 0.93 at 30-100% load for the full range of anticipated aircraft power factors, i.e., 0.8 – Unity with 12-pulse rectifier.

- Stand-by Losses: Less than 50 W

- No Load Losses: Less than 2000 W

R. SAFETY/FAULT REPORTING FEATURES

Each GPU shall have the following safety/fault reporting features incorporated as a minimum

1. Synchronizing at No Break Power Transfer
2. Input over- and under-voltage
3. Input overload
4. Internal high temperature
5. Internal voltage error
6. Output over- and under-voltage (according to MIL STD 704F)
7. Overload at output
8. Short circuit at output
9. Generative loads
10. Aircraft interlock

S. TESTING AND COMMISSIONING

T. FACTORY TESTS

Each functional assembly shall be inspected and tested at the factory prior to shipment for incorporation into the PBB. The client or his representative shall have the right to witness these tests, for which purpose a 30 days notification shall be given prior to test being carried out. Complete test reports shall be submitted. Test procedures shall be submitted by the contractor at least 30 days prior to the scheduled tests for review by the Owner. To ensure that the GPU complies with the technical specification, the supplier must have following factory test procedure:

1. The ground power unit supplier shall have a standard testing procedure
2. All ground power units shall be factory tested
3. Each test report shall be approved and signed by the test engineer
4. The testing instruments must be calibrated
5. As a minimum, the following features must be tested:
6. Output voltage regulation output
7. Frequency regulation heat/load test at full load
8. Overload capabilities
9. Test of safety features, e.g., interlock

A copy of the completed test reports shall be submitted to the client/his representative.

PART 3 - EXECUTION

3.01 FIELD TESTS

- A. The contractor shall provide a load bank for the purpose of testing and simulating aircraft usage for each of the GPU's. The load bank shall be capable of providing a

72kW load. Schedules shall be submitted to the client/his representative 14 days in advance of testing for comment. These should identify the proposed testing regime. The client shall be advised 30 days before any testing commences on site. The client or his representative shall be given the option to be present at the on-site tests. Completed test reports shall be submitted within 10 days of completion of the actual tests. Test reports shall contain suitable data reduction and calculation to verify the goals of the test plan and the system capacity.

3.02 WARRANTY

- A. The manufacturer shall provide a 12-month warranty for all component parts and labor of the GPU. The Warranty shall commence from the accepted commissioning of the solid state converter.

END OF SECTION 263543

SECTION 263544

AIRCRAFT GROUND POWER CABLE 400 Hz AND HOIST

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Work of this Section.

1.02 DESCRIPTION OF WORK

- A. The Contractor shall furnish and install ground power cables as indicated in the Contract Documents.
- B. Electrical wiring, including power, controls, and data are specified in Division 16, Section 16120.

1.03 REFERENCE STANDARDS

- A. National Electrical Code - NFPA 70.

1.04 SUBMITTALS

- A. Submit catalog cut sheets of product data in accordance with Section 01300 of these Specifications. Catalog cut sheets shall include specifications, installation instructions, and general requirements for type of cable required.

PART 2- PRODUCTS

2.01 CABLE MANUFACTURER

- A. J&B., Basis of Design
- B. INET
- C. Burton Electrical Engineering
- D. Ameribridge
- E. Or approved equal.

2.02 400 HERTZ CABLE WITH AIRCRAFT POWER PLUG

- A. Cables shall be banded type, ~~60-80~~ feet in length, suitable for nominal 115/200 Volt, 3-Phase, 4-Wire, 400 Hertz power. Cables shall be marked as required in Article 400-6 in compliance with the requirements of Article 300-11 which requires maximum rated voltage for which the conductor was listed, type of rating on insulation, the manufacturer's name, trademark, or other distinctive marking by which the organization responsible for the product can be readily identified, and the AWG size or circular-mil area. The conductors shall be color coded to meet the requirements of Articles 400-22 and 400-23 of the NEC. Components shall be as follows: ~~Power Conductors: 3 #1/0 AWG Class M stranding, Neutral Conductor: 1 #1/0 AWG Class M stranding, Control Conductors: Six Around One Single Jacketed Cable Power Conductors: 6 #4 AWG Class M, Extra flexible stranding, Neutral Conductor: 1 #1 AWG Class M, Extra flexible stranding, Control Conductors: 6 x 3, #8 AWG, E and F interlock wires and~~

control wires configured in a symmetrical layout to minimize inductive losses. **Provide cable with lightweight polyethylene cover for abrasion protection.** Voltage Rating: 600 VAC Ampacity: 260 amperes Frequency: 400 Hertz Voltage Drop: 2.99 Volts Measured at 90 KVA, 0.8 power factor on 60' 80' cable Voltage Unbalance: 0.20 Volts Measured at 90 KVA, 0.8 power factor on 60' 80' cable. Plug Section 1. Shall have a high visibility replacement contact section (nose) which allows for infield replacement in 3-5 minutes. 3. Molded tapered strain relief release at connector back. This release is required to accommodate the whipsaw action commonly used shall have a high visibility replacement contact section (nose) which when inserting and removing connectors from aircraft.

- B. Plug Section 1. Allows for infield replacement in 3-5 minutes. 2. Molded tapered strain relief release at connector back. This release is required to accommodate the whipsaw action commonly used when inserting and removing connectors from aircraft.
- C. Aircraft cable assembly shall be ETL-listed and labeled.

2.03 CABLE HOIST

- A. Electronically operated 400 Hz Cable Hoists:
 - 1. Operate from the Passenger Boarding Bridge 60A power supply.
 - 2. Enclosure shall be steel and weatherproof.
 - 3. Mounted to the apron-drive passenger boarding bridge.
 - 4. Of sufficient size to handle the length and size of the aircraft output cables provided.
- B. The cable hoist shall have over-retraction and over-extension limit switches which turn motor off and apply the brake. Shall have auxiliary Up/Down pushbuttons to raise and lower cables located in the frequency converter remote control panel. Provide all wiring associated with cable hoist operation.
- C. For 90kVA units provide one cable hoist for 400-Hz cable. For 180kVA units provide dual cable hoists for 400-Hz cables.

PART 3- EXECUTION

3.01 INSTALLATION

- A. Contractor shall install cable according to Manufacturer's instructions.
- B. Installation shall be coordinated to prevent the cable from lying on the ramp after installation susceptible to damage by construction traffic.
- C. Coordinate necessary mounting brackets for under bridge mounting with PBB manufacturer.
- D. Apply reflective tape to all units installed under PBB.

3.02 TESTING

- A. Prior to energizing, test conductors of cable for electrical continuity and for short circuits.
- B. Cables shall be energized prior to final acceptance to demonstrate proper functioning. Contractor shall replace defective cables, correct wiring errors and retest to

demonstrate compliance.

END OF SECTION 263544

SECTION 347713

PASSENGER BOARDING BRIDGES AND FIXED WALKWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section Includes:

1. Passenger Boarding Bridges (PBBs): Provide new apron drive passenger boarding bridges at gate F3A as indicated on the Drawings and in this Section capable of serving the A380-800 jet aircraft U1 service door (26 feet above apron) and the L2 service door for other wide body aircraft.
2. Fixed Walkways: Provide new fixed walkway section as indicated on the Drawings and in this Section. The fixed walkway tunnel extension shall meet all structural, dimensional, and finish requirements specified for the passenger boarding bridges.
3. Modification to existing PBB located at gate F3 to provide an anti-collision avoidance system and controls on the existing bridge to match those provided on new F3A PBB.

B. Related Work Specified Elsewhere:

1. Commissioning: SECTION 01810.
2. Carpeting: SECTION 096800.
3. Preconditioned Air Direct-Expansion Air Handling Units and Accessories: SECTION 335444.
4. Gate Monitoring System: SECTION 275900.
5. Ground Power Units (400 Hz): SECTION 263543.

1.03 REFERENCES

A. Passenger Boarding Bridges and Fixed Walkways shall comply with the following applicable standards:

1. Air Transport Association (ATA):
 - a. Spec. 101 - Ground Equipment Technical Data.
2. Americans with Disabilities Act (ADA): Comply with ADA requirements where specified, and as much as possible where not specifically required by this Section or the Local Governing Code.
3. American Society for Testing and Materials (ASTM):
 - a. A36 - Carbon Structural Steel.
 - b. A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

- d. A311 - Cold-Drawn, Stress-Relieved Carbon Steel Bars Subject to Mechanical Property Requirements.
 - e. A325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - f. A449 - Quenched and Tempered Steel Bolts and Studs.
 - g. A490 - Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength.
 - h. A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - i. A514 - High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
 - j. A517 - Pressure Vessel Plates, Alloy Steel, High-Strength, Quenched and Tempered.
 - k. A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
 - l. A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 - m. A572 - High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - n. A576 - Steel Bars, Carbon, Hot-Wrought, Special Quality.
 - o. A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - p. D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
 - q. E2074 - Test Method for Fire Tests of Door Assemblies.
4. American Welding Society (AWS):
- a. D1.1 - Structural Welding Code - Steel.
5. Federal Specifications:
- a. TT-P-641 - Primer, Paint, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
6. National Electrical Manufacturer's Association (NEMA):
- a. 4 - Watertight and Dusttight.
7. National Fire Protection Association (NFPA):
- a. 1 - Uniform Fire Code.
 - b. 70 - National Electrical Code (NEC).
 - c. 101 - Life Safety Code.
 - d. 415 - Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways.
8. Society of Automotive Engineers (SAE):
- a. J429 - Mechanical and Material Requirements for Externally Threaded Fasteners.

9. Society for Protective Coatings (SSPC):
 - a. SP1 - Solvent Cleaning: Removes oil, grease, soil, drawing and cutting compounds, and other soluble contaminants.
 - b. SP3 - Power Tool Cleaning: Removes loose material. Not intended to remove all scale or rust.
 - c. SP6 - Commercial Blast Cleaning: Two-thirds of each square inch free of all visible residues; remainder only light discoloration.
10. International Building Code with all current Georgia Amendments.
11. International Energy Conservation Code.

1.04 DEFINITIONS

- A. The terms "passenger boarding bridge" and "fixed walkway" and specified components of these, whether referred to in singular or plural form, apply to each unit provided in this Contract.
- B. Tunnels "A," "B," and "C" are referred to in the order from closest to the terminal to closest to the aircraft.
- C. The terms "right" and "left" refer to directions looking down the tunnels toward the aircraft.

1.05 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for review in accordance with the requirements of DIVISION 01. Shop drawings shall show sufficient detail to indicate conformance to the requirements of this Contract. Manufacturer's assembly or fabrication details that do not provide additional information needed to determine compliance with requirements are not acceptable and shall not be submitted. No fabrication and/or assembly of any of the passenger boarding bridge or fixed walkway components shall begin until the shop drawings for such components have been reviewed and accepted by the Owner's Representative. Additional shop drawings shall be submitted as necessary to fully describe the bridge and walkways to be delivered and ensure proper interface with the external environment. All drawings, sketches, details, and material shall be submitted in English language and in Inch-Pound units, including dimensions, volumes, weights, and forces. All Shop Drawings shall be signed and sealed by a Georgia-Registered Professional Engineer. Shop drawings shall include, but not be limited to, the following:
 1. An index prepared in chronological order listing all drawings, sketches, details, and material submitted.
 2. Project-specific general arrangement drawing.
 3. Product Data: Manufacturer's technical product data, including specifications. Include data substantiating that materials comply with requirements.
 4. Interior Finishes:
 - a. Interior finish schedule including interior wall and ceiling finishes. Include physical characteristics, such as durability, resistance to fading, flame resistance, and manufacturer's recommendations for maximum permissible moisture content of substrates.
 - b. Transition details.

- c. Wall finish attachment methods.
 - d. Light fixture details, ceiling materials, layout, and maintained illumination calculations at floor using the actual interior finishes (use 10% reflectance for the floor surface).
 - e. Passenger boarding bridge and fixed walkway section dimensions and general arrangement drawings.
 - f. Tunnel floor finish.
 - g. Cab floor finish.
 - h. Carpet edging details, including lines of demarcation between carpeted and hard surfaced floor, at wall areas, and treatment at doors and thresholds.
 - i. Carpet quantity.
 - j. Insulation.
 - k. Handrail details.
 - l. Bridge precooling/preheating grille.
5. Exterior Configuration:
- a. General bridge and walkway layout.
 - b. Exterior elevations.
 - c. Graphics/signage details.
 - d. Paint finishes.
 - e. Flashing (building to passenger boarding bridge or fixed walkway). Coordinate terminal flashing attachment method with Design Consultant following award.
 - f. Flashing (fixed walkway section to passenger boarding bridge). Coordinate terminal flashing attachment method with Architect following award.
 - g. Flashing (between bridge segments).
 - h. Cab door seal.
 - i. Ramp service stairway.
 - j. Emergency egress stairway.
 - k. Service/maintenance ladder, cage and cab roof handrails.
 - l. Gate sign.
6. Cab:
- a. Operator's cone of visibility, including mirrors for viewing drive wheels and apron.
 - b. Control panel location and functional layout.
 - c. View panels.
 - d. Safety devices.

- e. Aircraft interface for each aircraft type to be serviced using the appropriate PBB slope.
 - f. Features necessary for proper connection with required aircraft types including auto-leveling devices.
 - g. Operating instructions placard.
 - h. Cab doors.
7. Aesthetics and Safety Markings:
- a. Color and finish, exterior.
 - b. Reflective safety stripes on all equipment mounted below PBB.
 - c. Signage and plaques (interior).
8. Accessories:
- a. Ventilator unit.
9. Electrical, Mechanical, Structural:
- a. Certifications of Compliance with all referenced Design and Construction Standards.
 - b. Electrical power calculations that shall be signed and sealed by a Georgia-Registered Professional Engineer.
 - c. Electrical power and control schematic diagrams.
 - d. Hydraulic schematics.
 - e. Interface requirements for foundations and building supplied utilities.
 - f. Structural drawings including all foundation loading and other pertinent calculations which shall be signed and sealed by a Georgia-Registered Professional Engineer.
 - g. Welder qualifications and weld procedure qualifications.
 - h. The bridge and fixed walkway manufacturer shall provide the Owner's Representative with actual foundation loading data sheets for each type of bridge and each fixed walkway configuration provided based on load requirements specified in the "Structural Design and Support Elements" Article in PART 2 of this Section.
10. Anti-Collision System:
- a. Proximity sensors product data.
 - b. Laser collision avoidance product data.
 - c. Anti-collision system installation schematics showing sensor and laser locations for new and existing PBB.
 - d. Collision avoidance system program description and program, including ladder logic for the new PBB and existing PBB.
 - e. All associated controls.

11. Certificates of compliance with NFPA 415 from a certified testing company located in the continental United States. The manufacturer shall also provide affidavits attesting to the passenger boarding bridge's and fixed walkway's compliance with NFPA 415.
 12. Furnish notarized certifications that the bridges and fixed walkways, including all electrical, mechanical and hydraulic designs, components, and installations meet the requirements prescribed in this Specification.
- B. Spare Parts: List of recommended spare parts for a duration of 2 years of operation, including prices and sources.
- C. Operation and Maintenance Manuals:
1. Supply, upon delivery of PBB, five (5) copies of technical manuals for the passenger boarding bridge model furnished under this Contract. Manuals shall not be generic in nature and shall reflect the exact construction of each bridge furnished. Non-applicable items and drawings shall not be included in the manuals. Manuals may have descriptive type photographs. Pages shall have reinforced edges. Manuals shall be compact in size and bound. Manufacturer shall provide all listed manual information in PDF format on six (6) copies of CD-ROM disk.
 2. The technical manuals shall comply with ATA Spec 101 and contain the following information:
 - a. Description and operation of all systems and components.
 - b. Electrical drawings specific for each bridge furnished. Provide one set of bound, laminated electrical drawings for each bridge, to be placed inside the control console. Provide one set in each technical manual.
 - c. Maintenance instructions including troubleshooting/diagnostics guidelines.
 - d. Overhaul instructions.
 - e. List of parts with both component manufacturer and PBB manufacturer part numbers.
 - f. Illustrated parts list of all components.
 - g. Recommended spare parts list and sources.
 - h. Complete and detailed Preventive Maintenance Program for each type of boarding bridge furnished under this Contract.
 3. The Operation and Maintenance Manuals shall be provided in accordance with Closeout Procedures, SECTION 01770.
- D. Submit detailed procedures for Functional Site Testing Methods for approval prior to start-up and testing of the bridges.
- E. Training: Submit a detailed description including agenda and duration of training proposed.
- F. Test Reports: Submit all factory and field test reports to the Owner's Representative prior to the final inspection.

1.06 QUALITY ASSURANCE

- A. **Qualifications:** The manufacturer and installer shall provide evidence of at least five (5) years of satisfactory experience in the design, fabrication, and installation of apron drive passenger boarding bridges and fixed walkways. The installer shall be trained and certified by the manufacturer as having the necessary experience, staff, and training to install the manufacturer's products per the specified requirements. Materials used shall have been used successfully in similar installations and shall have withstood exposure for a period of at least five (5) years.
- B. **Regulatory Requirements:** The bridges and fixed walkways shall be designed to conform to all applicable Federal, State and Municipal Codes and regulations as applicable to the Project Site which are in effect at the time of manufacture.
1. All passenger boarding bridges and walkways shall conform to the requirements of NFPA 415. Certified documentation shall be provided.
 2. **Structural Design and Construction Standards:**
 - a. **American Welding Society Standards.** All welds shall be qualified weld procedures performed by qualified welders in accordance with AWS D1.1. Submit welder qualifications and weld procedure qualifications. All welds shall exhibit adequate penetration and shall be clean and free of slag. Welds shall not be ground to improve appearance except as required for flush surfaces or where nonstructural parts are involved.
 - b. All sheared or sharp metal edges shall be deburred or broken. All exposed metal corners shall have minimum radii in accordance with the appropriate material specification referenced in this Section.
 3. **Mechanical and Hydraulic Specifications and Standards:**
 - a. All mechanical and hydraulic components and designs shall conform to the recommendations and standards established by the Society of Automotive Engineers, Joint Industrial Conference and the American Society of Mechanical Engineers.
 - b. All threaded fasteners shall incorporate suitable locking devices.
 4. **Electrical Specifications and Standards:**
 - a. All electrical equipment and methods of installation shall conform to the requirements and recommendations of the American Insurance Association, the National Electrical Manufacturers Association, Joint Industrial Conference, the National Electrical Code, and any modifications to the NEC by the local authority having jurisdiction.
 - b. All electrical components utilized shall be recognized by Underwriters Laboratories/ETL in all cases where UL/ETL maintains a listing category for the devices installed.
- C. **Single Source Responsibility:** Obtain each product, material, premanufactured assembly or component from one supplier/manufacturer for all passenger boarding bridges and fixed walkways in this Specification. Obtain color, texture, grade, finish, and type of material from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver passenger boarding bridges and fixed walkways with protective coverings to prevent exposure of interior to weather, dirt and water.
- B. Factory and Field Storage: Protect passenger boarding bridge and fixed walkway interiors from weather, dirt, water and construction debris during storage at the factory and on Site. On-site storage shall be at the option of and coordinated with the Owner's Representative.
- C. Handling: Handle passenger boarding bridges and fixed walkways according to manufacturer's written rigging and installation instructions for unloading, transporting and setting in final location.

1.08 SEQUENCING AND SCHEDULING

- A. Working Area: Coordinate location of passenger boarding bridge and fixed walkway staging area, storage area and erection area with Owner's Representative, Airport Operations Authorities, and the Federal Aviation Administration.
- B. Foundations: Coordinate the installation of passenger boarding bridges and fixed walkways with installation of passenger boarding bridge and fixed walkway foundations.
- C. Bridge-Installed Equipment: Coordinate the installation of the 400-Hz ground power units, cable hoists, preconditioned air handling units, hose reels, building supplied electrical and communication services with installation of the passenger boarding bridges, fixed walkways, fixed walkway cooling unit and emergency egress stairs.

1.09 WARRANTY

- A. Special Project Warranty: Provide special project warranty, signed by Contractor, installer, and manufacturer, agreeing to replace, repair, or restore defective materials and workmanship of passenger boarding bridge and fixed walkway work during warranty period of 1 year from final acceptance. This warranty shall be in addition to, and not a limitation of, other rights the Owner's Representative may have against the Contractor or Manufacturer under the Contract Documents. It may run concurrent with other project warranties.
 1. "Defective" is defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected, and unsatisfactory conditions.
 2. Warranty Claim Response time: The manufacturer shall ship repair parts and send a qualified service technician (if required), to the Owner's Representative within 24 hours of being notified of an equipment failure while under warranty and parts shall be delivered to the applicable Owner's Representative facility within 48 hours from the time the order was placed by the Owner's Representative. If the manufacturer is unable to obtain the parts to restore the equipment to service, the Owner's Representative reserves the right to obtain the replacement parts or service elsewhere and charge the total cost to the manufacturer, including labor and administrative fees. The manufacturer shall pay all Customs fees, taxes, and freight for warranty parts during the warranty period.

1.10 MAINTENANCE

- A. Extra Materials: Provide the following materials for each bridge at installation:
1. Spare fuses, minimum one (1) each size.
 2. Paint touch-up kit, full and unopened.
 3. Aircraft closure repair kit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by the following:
1. JBT AeroTech, Jetway Systems.

2.02 MATERIALS

- A. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard pre-engineered passenger boarding bridge and fixed walkway systems and as required for a complete system. All equipment and parts provided shall be the manufacturer's latest listed and published stock models, except as permitted or required by the Owner's Representative. The equipment and parts shall meet all the applicable requirements of the Specifications.

- B. Material Specifications:

<u>Component</u>	<u>Applicable Standard</u>
Structural Plate	ASTM A36
Structural Steel & Shapes	ASTM A36 or ASTM A572 Grade 50
Steel Hollow Structural Sections	ASTM A500 Grade B
Steel Pipe	ASTM A53 Grade B
Steel Sheet	ASTM A570, ASTM A569 or ASTM A653
T-1 Steel	ASTM A514 or ASTM A517
Hinge Pins	ASTM A311 Grade 1018 or Grade 1144 or ASTM A576 Grade 1045
<u>Component</u>	<u>Applicable Standard</u>
Bolts-Standard	ASTM A307
Bolts-High Strength	ASTM A325, SAE J429 Grade 5 or 8, or ASTM A490

- C. Operational control limit switches shall be of the proximity type where practical. Ultimate limits switches shall be of the mechanical type.

2.03 APRON DRIVE PASSENGER BOARDING BRIDGE GENERAL REQUIREMENTS

- A. Design: The passenger boarding bridge shall be of telescoping three-tunnel design. The passenger boarding bridge, including telescoping tunnels, cab and canopy shall serve the A380-800 jet aircraft U1 service door (26 feet above apron) and the L2 service door for various other wide body aircraft including those indicated on the

Drawings. Foundation location with respect to the terminal wall and current aircraft layout are indicated on the Drawings.

- B. **Operation Limits:** The apron drive bridges shall continuously drive to any point on the terminal apron within the design operational range to accommodate the indicated aircraft. Minimum continuous operational range is indicated on the Passenger Boarding Bridge and Fixed Walkway Schedule and aircraft mix to be served is indicated on the Aircraft Gate Usage Schedule shown on the Drawings. The apron drive bridges shall have simultaneous directional movements including extension-retraction, lateral motion, vertical elevation, and cab rotation. Each passenger boarding bridge shall have a minimum continuous operation range as indicated on the Drawings measured from the center point of the rotunda to the center point of cab rotation. The passenger boarding bridges shall meet the full continuous range of horizontal and vertical movement specified throughout the full continuous range of cab rotation without requiring field modification to meet the full range of movement.
- C. **Operating Environment:** The bridge shall operate satisfactorily in the Atlanta, Georgia operational and climatological environment, under ambient temperatures from -25°F to 125°F with winds up to 60 mph on wet, ice-covered or snow-laden apron surfaces. The entire bridge shall be weatherproof when extended while parked to the aircraft and in the stowed position with the cab door closed. Equipment and controls exposed to the weather shall be of weatherproof-type or housed in weatherproof enclosures. Electrical panels or cabinets mounted external to the bridge shall be equipped with heaters or electric components to control condensation where required by the installation environment.
- D. **Operating Instructions:** A weatherproof and water resistant placard outlining the bridge operating instructions shall be displayed in a prominent location in the cab of each bridge in plain sight of the Operator. A qualified graphics expert shall prepare the placard and the displayed instructions.
- E. **Safety Requirements:** The purpose of these Specifications and standards is to describe the requirements, quantities, performance and maintenance properties of the boarding bridge design and installation. Safety to passengers, employees, other personnel, aircraft and equipment is of prime importance. Nothing in these Specifications shall relieve the manufacturer or Contractor of the responsibility for providing and installing a safe product.
 - 1. All equipment shall be designed to be fail-safe and all controls that regulate bridge motions (i.e., horizontal travel, vertical travel, and cab rotation) except for the cab auto-level feature shall be of the dead-man type. Dead-man type shall mean controls that require the operator to apply constant pressure to be engaged. Once the pressure is released the control is disengaged.
 - 2. All operating mechanisms (i.e., horizontal and vertical drive, cab rotation) shall be designed so the drive mechanism is locked with a manual release override when power fails or is shut off.
 - 3. Positive mechanical stops shall be provided to prevent over-travel where any component might become disengaged from its guiding or restraining component. The positive stop shall be in addition to all limit switches provided to restrict over-travel during normal operating conditions, including drive wheel steering motions and cab rotation. This does not apply to tunnel rotation which shall have dual limit switches. Mechanical stops shall be identified and detailed on the Shop Drawings.

4. The operator's position in the control cab shall be designed to provide the operator adequate visibility to position the boarding bridge with the cab weather door closed. Suitable enclosures, guard rails, and other restraint devices shall be provided to protect the operator from being pitched out the open end of the cab in case of sudden stops or inadvertent movements of the bridge when operated with the door open. An operator handhold shall be attached to the wall near the control station.
5. Fall protection shall be provided for technicians working on the roof consisting of a stainless-steel tie-off cable.
6. Highly reflective and daylight visible safety stripes shall be provided on any auxiliary equipment mounted below the boarding bridge.
7. Safety decals shall be provided on the cross tube of the drive column wheel bogie to warn against storing anything on the cross tube and to warn about the danger of getting a foot run over.

F. Maintenance Provisions:

1. Maintenance requirements shall present no special obstacle to personnel knowledgeable in their respective fields of hydraulics, electrical power and controls, or general mechanical assembly.
2. Install bridge and fixed walkway components with adequate access and appropriate fastener types to permit change-out by one person. If a component's weight requires mechanical assistance to lift, the component or assembly shall be provided with lift eyes, fork lift guides, or other means of providing a mechanical advantage. Components shall be simple, rugged and easily accessible for routine maintenance, lubrication, exchange and adjustment. Electrical cabinets, hydraulic cabinets and pumps shall be located so they are always accessible to maintenance personnel. All interior electrical cabinets shall have a door-operated light for illuminating all interior components.
3. Access panels, where required to gain access to equipment or maintenance areas, shall be sized to allow necessary tools and equipment to be inserted to complete the Work. The panel shall be permanently attached to the structure by stainless steel hinges, and any fasteners required shall be stainless steel permanently affixed to the panel.
4. Provide all product specific tools required for routine maintenance.
5. Modular components: Utilize standardized modular components that are readily available in the continental United States to provide rapid corrective measures of malfunctioning critical components. Critical bridge components shall be located to allow for ease of access and installation.
6. All hardware items required including, but not limited to, bolts, studs, nuts, washers and fasteners shall be provided in Inch-Pound unit sizes. Exterior hardware and fasteners shall be stainless steel where practical.
7. The manufacturer shall maintain an adequate inventory of all proprietary or vendor fabricated and modified parts for routine maintenance of the unit. All stock shall be maintained, whether or not the unit is in current production, for a minimum of ten (10) years from date of the last unit supplied.

8. All mechanical and electrical systems shall be protected from potential damage resulting from climatic conditions, falling objects or collision with aircraft service equipment and other moving vehicles.
 9. All cable ties, fasteners, and other items subject to direct or indirect sunlight shall be ultraviolet light rated.
- G. Power and Communication Characteristics:
1. The passenger boarding bridge and walkway shall operate on a 480V, 3-phase, 60-Hz, 60-Amp power circuit, with ground and neutral. Each passenger boarding bridge shall be provided with an electrical disconnect switch mounted to the rotunda column. See the drawings for disconnect switch requirements. Electrical, communication, and fire alarm service is shown on the Terminal Building Electrical Drawings.
 2. Provide transformers and circuit breakers as required to transform the 480V, 3-phase power to 120/208V or 120/240V power or as otherwise required for boarding bridge and fixed walkway power distribution.
 3. All exterior electrical components shall be housed in enclosures conforming to NEMA 4.
 4. Provide sufficient cable lengths to reach the PBB disconnect switch at the rotunda column and junction boxes mounted on the terminal wall. Cable length shall be estimated from Drawings with sufficient spare length and exact length determined in the field.
 5. Provide strain relief devices on all unsupported cables. Supporting cables by zip ties is not acceptable. Supports shall not have sharp edges.
 6. Provide cabling for the following across each bridge: Bridge power, including, but not limited to, power, lighting, controls, and gate sign; Ethernet communication cable; 400-Hz frequency converter; pre-conditioned air unit; gate docking system; smoke detector alarm signal from PBB and PCA; collision avoidance system; telephone and DAS and Wi-Fi system. Cables shall be flexible copper.
 7. Rotunda Column Grounding: Provide a grounding stud on the rotunda base plate. Rotunda base anchor bolts are not ground rods and shall not be considered as such.
 8. Electrical Components:
 - a. General: All electrical equipment and components shall be manufactured in Inch-Pound units and conform to recommendations and standards listed in the Quality Assurance Article.
 - b. Electrical Junctions: All electrical junction points and connections within the boarding bridge shall be made directly to terminal strips, not by means of plug-type connections or splices. Electrical connections between major bridge components/accessories and the bridge, such as horizontal and vertical drives shall be heavy-duty quick-connect type.
 - (1) Power cables shall be hardwired from the passenger boarding bridge disconnect switches or J-boxes directly to disconnect switch at the rotunda column.

- (2) Electrical or communication service conduit shall not be permitted on the exterior sides of the passenger boarding bridge.
 - (3) All cables and wiring shall be installed in cable carrying devices approved by the Owner's Representative.
 - (4) All electrical switch and receptacle device plate covers shall be stainless steel and shall match the device configurations, and on exposed wiring shall exactly fit the outlet box dimensions.
- c. All electrical circuitry shall be successfully tested before the unit leaves the manufacturer's plant.
 - d. Primary Power: The main primary power "ON" indicator light shall be located on the operator's control panel adjacent to the power "ON/OFF" control switch.
 - e. Anti-Chafing Devices: Whenever electrical cables are required to slide or move, anti-chafing devices shall be provided. Acceptable anti-chafing devices include grommets, flexible sleeves and jackets, and other similar approved devices.
 - f. Identify all cables with wire/cable identification bands on both ends. Bands shall be pre-numbered plastic coated style or type-on style with clear plastic self-adhesive cover flap, numbered to show circuit identification numbers indicated on Shop Drawings.
 - g. All J-boxes shall be labeled with engraved placards to indicate usage (i.e., 400-Hz, PCA, PBB Power).
 - h. Breakers in the raceways or J-box shall be resettable from a locked box located on the side of the bridge, accessible from the service stairs and labeled appropriately.
- H. Mechanical Characteristics:
1. Mechanical and Hydraulic Design and Components:
 - a. Only standard components readily available in the continental United States, manufactured in Inch-Pound standard units and conforming to recommendations and standards listed in the Quality Assurance Article shall be used.
 - b. All operating mechanical and hydraulic components shall be assembled and tested before the unit leaves the manufacturer's plant. The Owner's Representative shall be notified in advance of and may witness testing.
 - c. Hydraulic cylinders shall be designed for seal replacement by maintenance technicians.

2.04 PERFORMANCE REQUIREMENTS

- A. Aircraft: The passenger boarding bridge shall be capable of servicing the A380-800 aircraft U1 service door and the L2 service door for various other wide body aircraft.
 1. Passenger boarding bridges shall meet the full continuous range of vertical travel indicated, measured from the apron to the cab spacer leveled edge with the cab fully rotated counterclockwise and the tunnels fully extended perpendicular to the terminal wall, as installed, without requiring field modification.

2. Mounting locations of equipment and accessories shall be made such that the PBB shall meet the full cab height range. Low cab height range may be achieved by providing a side-mounted PCA hose reel. Mounting of PCA unit or GPU in a location other than under the PBB cab will be considered only if there is not enough room for it to be mounted under the PBB cab.
- B. Telescoping Tunnel Slope: Maximum slope in any direction shall be 1:12 (8.33%) measured in the tunnels (except at the transition ramps), for each aircraft serviced.
- C. Cab Rotation: The cab shall be designed to rotate a total of 125° (92.5°-95° counterclockwise and 32.5°-35° clockwise from center) at a maximum speed of 145° per minute in either direction.
- D. Bridge Rotation: The rotunda shall permit the entire unit to rotate 175° (87.5° clockwise and 87.5° counterclockwise).
- E. Drive Wheel Rotation: Steer angle shall be 180° in place and in motion. Steer speed shall be adjustable from 16° per second minimum to 42° per second minimum.
- F. Vertical Lift Speed: 2.5 feet per minute (fpm) to 4 fpm as measured at the cab spacer.
- G. Drive Speed: The drive system shall permit the unit to extend/retract and rotate to any point within its range of required movement at a variable speed between 0 and 90 fpm.
- H. Deceleration: The horizontal drive system shall include a decelerator device to reduce or eliminate shocks when approaching maximum extension or retraction, or when horizontal travel is stopped or reversed suddenly, for protection of the equipment and passenger boarding bridge operator.

2.05 STRUCTURAL DESIGN AND SUPPORT ELEMENTS

- A. Loads: In addition to the dead loads and dynamic effects caused by movement, the entire passenger boarding bridge and fixed walkway shall support the following minimum loads, and those of all attachments to the bridges, unless the governing building code prescribes more severe requirements. These loads may be applied in total or in part, singularly or simultaneously. The submitted sealed structural design calculations shall be based on the combination that imposes the most adverse loading.
 1. Live Load PBB (Extended or Retracted) and Fixed Walkways: 40 lb./sq. ft.
 2. Wind Load:
 - a. Retracted and Stowed: 25 lb./sq. ft., or an approximate wind velocity of 90 mph.
 - b. Operational: 12.5 lb./sq. ft., or an approximate wind velocity of 60 mph.
 3. Roof (Snow) Load: 25 lb./sq. ft. and the ability to support a 300 lb. person at any location on the roof.
 4. Equipment Minimum Loads (Approximate - Sole responsibility remains on PBB manufacturer for coordinating and supporting equipment loads mounted on the bridge):
 - a. Preconditioned Air Handling Unit 8,000 - 10,000 lbs. Mount under the "C" tunnel.
 - b. Hose Reel and Hose: 350 lbs. Below cab as required to provide space for the bridge to lower to the specified range. Mount where required.

- c. 400-Hz Point-of Use-Ground Power Unit: 2,750 lbs. Under cab unless there is not enough clearance. Coordinate alternative mounting location with Owner.
 - d. 400-Hz Cable Hoist: 600 lbs. Top right of side of cab. Provide quantity as required.
 - e. Gate Sign: 200 lbs. Right side of cab.
5. The structural design shall provide sufficient torsional rigidity to minimize sway when the boarding bridge is brought to a gradual stop.
 6. All mechanisms for actuating, guiding and restraining the boarding bridge and its components shall be designed to minimize the noise, deflection, and vibration apparent to passengers. No operating vibrations or loads shall be transmitted to the Terminal Building.

2.06 BRIDGE ASSEMBLY ELEMENTS

A. Rotunda Assembly:

1. Corridor:
 - a. The rotunda entry corridor shall be a fixed rectangular tunnel at a constant height that connects the Terminal Building or fixed walkway with the rotunda.
 - b. The rotunda entry corridor shall be cantilevered from the rotunda column to the Terminal Building face or the mating frame of the fixed walkway.
 - c. Provide corrosion resistant exterior flashing to create a weather-tight connection between the rotunda entry corridor and the Terminal Building or fixed walkway. Flashing shall be sloped so as not to trap or pond water. Provide interior metal flashing to allow bridge movement. Interior metal flashing shall be painted to match PBB interior and shall be connected only to corridor (not to Terminal Building) and shall have felt backing on Terminal Building interface side to prevent chafing of terminal. Coordinate terminal flashing attachment method with Owner's Representative following award.
 - d. Door Threshold: Install a threshold at the fixed walkway/boarding bridge interface that allows for bridge movement. The threshold shall be aluminum diamond plate.
2. Rotunda:
 - a. The rotunda shall be a cylindrical structure supported on a tubular column. The rotunda floor shall remain level at all positions and shall be installed at the same elevation as the terminal floor or fixed walkway corridor.
 - b. Flap-type seals (dual) shall be provided for complete weather tightness between the rotunda and the hinged telescoping tunnels.
 - c. Rotunda side curtain shall be aluminum and provided with adjustable tensioning devices or positive tracking system and interior weather seals. The exterior metal curtain covers shall be full length with stainless steel hinged access panel to allow access to curtain idler barrel grease fittings.
3. Support Column:
 - a. PBB shall not be anchored or secured to the Terminal Building, nor shall it transmit any live or dead loads or vibrations to the Terminal Building.

- b. Rotunda support columns shall use an industry standard #7, 8-bolt, foundation anchor bolt pattern.
 - c. Coordinate and verify quantity, location, and details of foundation design prior to fabrication.
 4. Bolts:
 - a. Provide (8) 2-1/4-inch, 4-foot long anchor bolts per support column to foundations contractor prior to pour of concrete footings and bases.
- B. Telescoping Tunnels:
 1. Telescoping tunnels shall be rectangular in cross-section, constructed of metal panels and hinged at the rotunda end for vertical motion. Minimum inside dimensions of the telescoping tunnels, not including handrails, shall be:
 - a. Minimum Interior Width; C Tunnel: 4 feet-10 inches
 - b. Minimum Interior Height: 6 feet-11 inches
 - c. Minimum Transition Ramp Width: 4 feet-5 1/2 inches
 2. Where telescoping sections overlap, low angle transition ramps shall be provided to accommodate the difference in elevation. The inner tunnel transition ramp shall be hinged and slope shall be less than 3° relative to the tunnel centerline.
 3. Provide flat roof tunnel with a slip resistant surface and with adequate provisions for water to freely run off.
 4. Design the telescoping tunnels and all other elements of the structure to resist the accumulation of water at low points and pockets in the structure. Drain holes shall be provided where necessary to drain collection points in any operating attitude. Drains from internal gutters shall be carried clear of the structure and attached equipment, including 400-Hz ground power unit and PCA unit by aluminum gutters, and shall be sized to prevent blockage by accumulated debris.
 5. Provide mechanical stops with elastomeric bumpers to prevent over-travel in the event of limit switch failure.
 6. Maintain clearance between the telescoping tunnels such that no soiling or wear of the interior surfaces occurs as the result of movement.
 7. Utilize flap-type seals (dual) between the individual tunnel assemblies to provide a weather tight seal and to prevent the entrance of fire and/or smoke in the event of an apron fire. Exterior seals shall utilize EPDM rubber and meet the fireproofing requirements of NFPA 415.
- C. Fixed Walkways:
 1. Fixed walkways shall be of similar construction to that of the telescoping "B" tunnels.
 2. Minimum inside dimensions of the fixed walkway, not including handrails, shall be:
 - a. Minimum Height: 7 feet-7 inches
 - b. Minimum Width: 56 feet-10 inches; Handrail to Handrail: 6 feet-3 inches.

3. Provide exterior flashing to create a weather-tight connection between the fixed walkway and the Terminal Building. Flashing shall be sloped so as not to trap or pond water. Provide interior metal flashing. Interior metal flashing shall be painted to match PBB interior and shall be connected only to fixed walkway (not to Terminal Building) and shall have felt backing on Terminal Building interface side to prevent chafing of terminal. Coordinate terminal flashing attachment method with Owner's Representative following award.
 4. Terminal Door Threshold: Install a threshold at the terminal door/fixed walkway interface that allows for fixed walkway movement and building settlement. The threshold shall be aluminum diamond plate.
 5. Support Column:
 - a. Fixed walkway shall be supported and cantilevered from the rotunda support column at the rotunda end.
 - b. Fixed walkway support columns shall use an industry standard #127 foundation anchor bolt pattern.
 - c. Coordinate and verify quantity, location, and details of foundation design prior to fabrication. Coordinate and verify structural details prior to fixed walkway fabrication.
 6. Support fixed walkways at the terminal building end from structural steel attached to the terminal building.
 7. Sloped Fixed Walkways: Provide walkways sloped where required.
- D. Bridge and Fixed Walkway Insulation:
1. Insulation shall be provided in the walls and ceiling.
 2. Insulation in ceilings shall be 1-inch thick, black, mat faced fire-resistant fiberglass.
 3. Insulation in walls shall be 1/2-inch, and shall be provided with air space between the insulation and tunnel materials.
 4. Insulation materials shall not be exposed to the weather or applied with glues or tape.
 5. All insulation materials shall be covered with appropriate weather resistant finish material.
 6. Insulation shall be installed full width of ceiling with all areas insulated. Insulation shall butt against light frame edges with separate piece over light fixture.
 7. The design shall eliminate the possibility of condensation in the insulation that might cause unsightly water stains appearing on the interior finished surfaces and rust at the interface of the insulation and outer shell.
 8. The use of asbestos or asbestos products as an insulation material or for any other use is not permitted.
- E. Aircraft Cab:
1. The cab shall be equipped with a forward facing operator control station located behind a window to permit the operator full view of the aircraft contact area. Additional visibility shall be provided through windows to the left and right sides of the control station.

2. Cab roll-up side curtains shall be aluminum slats. The left and right curtains shall be equipped with interior weather seals and shall be interchangeable. The exterior metal curtain covers shall be full length with stainless steel hinged access panel.
3. Cab shall be equipped with double swing doors installed to seal the interior from outside weather conditions when the door is closed. The minimum door width shall be 43 inches and minimum height shall be 7 feet-8 inches. Provide swing doors with return closure, stainless steel kickplates on both sides, and deadbolt type latch.
4. The cab shall be rotated by a gear motor and chain drive operating on the circumference of the fixed circular floor section of the aircraft cab. Adjustable limit switches and fixed physical stops shall control the limits of rotation.
5. Articulating Cab Floor: The aircraft end of the cab shall be provided with an automatic level device when the cab is rotated at an angle up to 95° off the centerline of the bridge tunnels.
 - a. The articulating cab floor shall level automatically and shall be equipped with a manual override control switch. The floor shall be capable of providing a level surface adjacent to the aircraft doorsill for passenger boarding bridge slopes from -10% to +10%.
 - b. No portion of the cab floor shall exceed 1:12 (8.33%) slope in the direction of expected passenger traffic. Walking surface shall be smooth with no raised surfaces that may introduce a tripping hazard.
 - c. The system shall include a double hinge floor. The maximum slope of this floor shall be limited to +/- 6.5° (11.4%).
6. Spacer: Provide a spacer (bumper) spanning the full outside width of the boarding bridge cab opening, along the front edge of the cab floor at the point of contact with the aircraft.
 - a. Spacer installation and material shall not mark the aircraft skin, and shall prevent any damage or abrasion of the aircraft skin when the bridge is in contact with the aircraft.
 - b. The spacer shall provide bodily support when stepped upon, and shall have a Shore A Durometer hardness of 70 +/- 5 when measured in accordance with ASTM D2240.
 - c. The spacer material shall be an EPDM, or other suitable polymer, compounded to meet the fireproofing requirements of NFPA 415.
 - d. Passenger boarding bridge motion control or limit devices mounted on the spacer shall be located one at each end and one along its centerline. Limit devices shall not be lever-type limit switches.
 - e. Provide Safety Track or 3M anti-skid on C-channel between the cab floor and spacer.
 - f. No metal trim or structural element shall be capable of contacting the aircraft fuselage outside the canopy padding and/or spacer.

F. Aircraft Closure (Canopy):

1. The aircraft end of the cab shall be equipped with an adjustable closure with folded accordion bellows to make a weather-tight seal against the aircraft. Provide inner liner curtain that covers the canopy frame members.
2. The closure shall be able to enclose both the open aircraft door and doorway of all aircraft served at each gate and specifically the A380 aircraft.
3. The entire Aircraft Closure shall be designed to be water-resistant, ultraviolet light rated, withstand weathering, remain elastic and flexible between -31°F and 127°F, be tear-resistant, and meet fire resistance requirements of NFPA 415. The aircraft closure color shall be gray.
4. Each side of the aircraft closure shall use electrically and independently controlled adjustable actuators, to permit the seal to conform to critical aircraft contours and provide a weather-tight seal. The actuating mechanism shall be designed to preclude excessive pressure on the aircraft fuselage.
5. All actuators for the canopy, automatic leveling device, and other controls shall be provided with rigid covers to protect them from passenger contact.
6. Cushion pad seals shall be provided at the point of contact between the canopy and aircraft fuselage to prevent denting or scratching of the aircraft skin or cabin and cockpit windows. This includes damage to rain diverters or troughs that may be located over the doors. The seals that contact the aircraft shall be segmented and attached to the main closure assembly by Velcro-type fastener strips.
7. Canopy supports or stiffening rods shall be thoroughly padded to prevent contact with the aircraft and protect canopy material when in its retracted position. The padding shall be firmly attached in such a manner that it will not slip, turn, twist, or distort from repeated usage. Allow replacement of the padding sides and top, and any inserts in sections, without replacing the entire canopy.
8. Changes in the position of the aircraft and/or passenger boarding bridge while the canopy is in contact with the fuselage shall not cause excessive loads to be exerted on the aircraft skin. Pressure exerted by closure against the aircraft fuselage shall not exceed 2 psig. Dependence upon the automatic leveling device alone to prevent such an occurrence is not acceptable.
9. Any chains, cables, or electrical wires that penetrate the floor or wall structure shall have adequate clearance, be protected, and securely fastened.
10. Cab seal shall be resilient bellows type. Tarpaulin types are not acceptable.
11. The canopy, when in its retracted position, shall be protected by a rigid metal hood to prevent water from flowing into the folds of the canopy material when the bridge is not in use. Exterior canopy liner shall be inherently designed to prevent water ponding in the folds.

G. Service Assembly:

1. No service door or landing is required for the A380 PBB at gate F3A due to the tight docking clearance with the A380 aircraft engine.

H. Drive Column: The drive systems shall be either hydraulic or electro-mechanical and meet the criteria listed below.

1. Vertical Drive - Electro-Mechanical:

- a. The bridge shall be moved vertically by means of two recirculating ball bearing screw assemblies. Each assembly shall be independent of the other, with individual motors. Each assembly shall be capable of supporting the passenger boarding bridge and attached equipment, including preconditioned air handling unit, and 400-Hz ground power unit, under full design load. The lifting mechanism shall hold its position at any elevation within the travel range with or without power supplied.
- b. The ball screw ball nut shall be equipped with wiper brushes to remove grit or dirt from screw threads and a self-locking acme-type thread which will prevent unit collapse in the event of ball nut failure.
- c. The vertical drive motors shall be AC induction motors with integral reducer and brake. The brakes shall be spring-applied and electrically released only when signal is received from the operator's console or the auto-level system.
- d. The brakes shall hold securely at all elevations, without creeping, whether the bridge is in operation or not.
- e. A fault detector shall sense differential motion of the ball screw assemblies. The fault detector circuit shall shut down the electrical power to the vertical drive motors and set the brakes independently of the operator if a fault is detected. Drive column fault shall not falsely occur at any height within the indicated range due to flexing of the lift columns.
- f. A tapered collar that prevents the screw from disengaging the ball nut shall be attached to the ball screw's lower end.
- g. Reference stripes shall be painted or mechanically fastened on the inner tubes to indicate column travel limits, both high and low.
- h. Backup emergency plunger-type limit switches shall be provided in the vertical circuit, for both high and low limits.
- i. Inspection holes in each column tube shall be provided to allow baroscope inspection of the ball screw surface. All holes shall be aligned in inner and outer column tubes. Cover plates shall be provided in outer tube.
- j. Ensure the vertical drive column provided is long enough and in the correct position to continuously travel the full range of cab movement indicated.

2. Vertical Drive - Hydraulic:

- a. The hydraulic pump and motor drive for vertical travel of the bridge shall be an integral part of the drive wheel assembly, accommodate the size and weight of the bridge and attached equipment including preconditioned area unit and 400-Hz ground power unit, and operate smoothly and quietly.
- b. The hydraulic power system shall permit simultaneous vertical travel and horizontal travel and steering.
- c. The hydraulic power system shall utilize a heavy-duty oil-based hydraulic fluid with corrosion inhibitors.

- d. The operating temperature environment shall determine hydraulic oil viscosity. Special synthetic hydraulic oils having a low viscosity index shall be supplied for extremely low-temperature environments. Provide hydraulic oil based on the project location environment.
 - e. All hydraulic components shall be designed for maximum corrosion resistance and compatibility with the hydraulic fluid used.
 - f. Vertical travel shall occur by driving two hydraulic cylinders to the desired height by means of solenoid-operated hydraulic valves.
 - g. Hydraulic cylinder rods shall be chrome plated. The hydraulic cylinders shall be equipped with a vertical drive pump brake (pilot-operated check valves) which automatically releases when hydraulic pump(s) are in operation and vertical motion, up or down, is signaled from the operator's console or from the auto-level circuit.
 - h. Pilot-operated check valves located at hydraulic cylinders shall prevent bridge downward movement in the event of a total hydraulic system failure, including rupture of any hydraulic hose in the system.
 - i. Each drive column shall be designed to support the full weight of the bridge and attached equipment if the other should fail.
 - j. Provide manual vent valves at the high points of the vertical drive system to bleed air from the hydraulic system.
 - k. Ensure the vertical drive column provided is long enough and in the correct position to continuously travel the full range of cab movement indicated.
3. Horizontal Drive - Electro-Mechanical:
- a. A variable speed electro-mechanical drive system shall provide horizontal travel of the passenger boarding bridge. The drive shall be two-wheeled with solid tires.
 - b. An AC gear motor shall independently drive each wheel. The gear motors shall be provided with integral brakes. Solid-state variable frequency motor controllers shall drive the AC motors. The controller shall provide built-in diagnostics to assist in trouble shooting.
 - c. A regenerative braking system shall allow the bridge to come to smooth, controlled stops. Integral electrically-released spring actuated brakes shall be provided with each drive motor and shall lock the bridge in place whenever electrical power is cut off, either by moving the control lever to the neutral position or if power fails.
 - d. Provide a manual override to release drive wheel brakes to permit towing the passenger boarding bridge into or out of position on the apron in case of power failure. The override system shall be mechanically interlocked to preclude normal operation with the brakes locked out.
 - e. Connection lugs shall be provided to allow the bridges to be towed in the event of power failures.
 - f. Provide positive identification for both the front and backsides of the wheel bogie.

4. Wheels and Tires:
 - a. Passenger boarding bridge wheels and tires shall be of sufficient width and surface quality to preclude damage to apron pavement and shall be designed to operate on Portland cement or asphalt pavement.
 - b. The tires shall be solid rubber with treads suitable for use by passenger boarding bridges. Tires shall be manufactured of a rubber compound that will not chip or fray at the edges, and not be affected or damaged due to contact with oil, lubricating and hydraulic fluids, and/or fuels from aircraft and servicing equipment, including Skydrol hydraulic fluid.
 - c. Each tire shall be rated for wheel loading under full dead and live loading.
 - d. Only the wheel to axle hub bolts/nuts shall be able to be removed while the wheel is mounted on the wheel bogie. This shall preclude accidentally loosening the tire from the rim while still mounted on the wheel bogie assembly.
 - e. The wheel and tire changing procedures shall be specified in the Maintenance Manual.
 - f. Solid rubber tires shall have a projected life of more than 10 years.
- I. Brackets for Equipment Mounting:
 1. Provide factory installed mounting brackets for GPU, PCA unit, and Automatic Docking System Controls. Coordinate bracket requirements with manufacturer of each unit.
- J. Controls:
 1. Control Station General Requirements:
 - a. Passenger boarding bridge shall be controlled by an Allen-Bradley programmable logic controller (PLC).
 - b. The PBB shall have the ability to communicate via Ethernet and transmit data (including systems status and operational information) to a building management system. The unit shall also have the ability to communicate directly with the 400-Hz GPU and the pre-conditioned air unit to obtain data from each. The PBB shall have the ability to transmit this data to a building management system. Coordinate communication requirements with the 400-Hz GPU and pre-conditioned air unit manufacturers.
 - c. Locate all passenger boarding bridge operator controls on the bridge cab control console in a position that provides maximum operator visibility as the bridge is maneuvered near the aircraft with the cab weather door closed.
 - d. Locate the operator control station to provide adequate space for the operator and maintenance access to the electrical control components as required by voltage classification in the National Electrical Code.
 2. Control Console: The control console shall be located in the operator compartment and protected from the outside environment. The control console shall be tamper and theft proof. Provide two door locks, top and bottom, and hold open gas shock or other means to hold the door open. Provide hinged console face and support rod.

- a. Provide lighted and labeled controls for all switches and indicators. Console shall have a lamp test button to test all console lamps and alarms. Lamp test shall be enabled in the operator switch "OFF" position only and shall supply power to console lamps.
- b. Provide 5-inch LCD monitor mounted in console face and closed-circuit surveillance camera mounted under bridge near rotunda column to view under bridge area and passenger boarding bridge wheels from the operator control station.
- c. Provide a diagnostic touchscreen with accessory controls and indicators, mounted in console face to provide the operator with a graphical user interface to the PLC controls, and to provide authorized personnel access for setting limits, diagnostics, viewing trouble logs, etc. Motion controls shall not be by touchscreen.
- d. Controls: All passenger boarding bridge motion controls shall be the momentary contact (deadman) type. All motion controls shall be located to be relative to the function of the passenger boarding bridge being controlled (i.e., with raise and lower functions, the "RAISE" push button will be located above the "LOWER" push button). The control console includes the following control switches and/or **touchscreen** indications for the following:-
 - (1) Master Key Switch, Off/Operate/Auto (Automatic Leveling), with key only removable in the "Off" or "Auto" position.
 - (2) Power On (Green illuminated) (Black Button).
 - (3) Emergency Stop (Red Mushroom Button lit when depressed).
 - (4) Lamp Test (Black Button).
 - (5) Cab Rotate Left and Right (White illuminated) (Black Button).
 - (6) Canopy Up/Down Left Side (White illuminated) (Green Button/Arrow).
 - (7) Canopy Up/Down Right Side (White illuminated) (Green Button/Arrow).
 - (8) Cab Floor in Auto On/Off (White illuminated) (Black ON Button, Red OFF Button).
 - (9) Cab Floor in Manual Tilt Left or Right (White illuminated).
 - (10) Travel Warning Bell (Blue Button).
 - (11) Steering Left or Right (White Illuminated) (Blue Button/Arrow).
 - (12) Forward or Reverse Spring Loaded 2-way Joystick.
 - (13) Vertical Up or Down (White illuminated) (Blue Button/Arrow).
 - (14) Flood Lights On/Off (White illuminated) (Black ON Button, Red OFF Button).
 - (15) Ventilator On/Off (White illuminated) (Black ON Button, Red OFF Button).
 - (16) 400-Hz On/Cable Deployed Flashing Light (Red lens illuminated) (Horizontal drive interlock applied).

- (17) Lift Column Fault (Red illuminated).
 - (18) Canopy Down (Red illuminated).
 - (19) Auto Level On (Amber illuminated).
 - (20) Auto Level Alarm for Auto Level Failure (Red illuminated with audible alarm).
 - (21) Swing Limit Warning (Red illuminated with audible alarm).
 - (22) Swing Digital Readout (Black Button).
 - (23) Height Meter and Swing Read Meter (LED).
 - (24) Wheel Position Indicator, showing arrow and wheels.
 - (25) Preconditioned Air in Use Flashing Light (Green). (Horizontal drive interlock applied).
 - (26) Bridge Precooling/Preheating On/Off (White illuminated) (Black ON button, Red OFF button).
- e. Labeling: All switches and/or push buttons shall be labeled. Each function shall be spelled out (i.e. "Canopy", "Extend", "Retract").
- f. Warning devices (unless otherwise noted, see indication method above):
- (1) A cab floor height indicator shall show when the cab floor elevation is at the proper height (theoretically correct) for each aircraft to be serviced.
 - (2) A wheel position indicator shall show the orientation of the wheels along with the true tunnel centerline, regardless of the cab's rotational position.
 - (3) An amber light to indicate that the auto level function is energized and operating.
 - (4) An auto level malfunction shall be indicated with a red light and shall be accompanied by an audible warning.
 - (5) A swing limit reached shall be indicated on the HMI, or with a red light on the console.
 - (6) A red light shall indicate when the aircraft closure is in the down position (aircraft closure must be retracted before the bridge can be moved).
 - (7) For electro-mechanical vertical drive systems, a red light shall indicate a lift column malfunction has occurred.
 - (8) A light shall indicate if the cab floor de-icer is on or off (if applicable).
 - (9) If a pushbutton type switch is used, a light shall indicate if the adjustable cab floor is in the automatic or manual mode.
 - (10) Switch On/Off with light for the rotunda roof mounted exhaust fan.
 - (11) Warning flashing 60W amber rotating beacon under cab when bridge is in Operation Mode only.

- (12) 110 Volt Travel Alarm Bell (98 decibels at 10 feet).
- g. Preconditioned Air Handling Unit Precool/Preheat: Provide controls to allow the operation of the precool/preheat function of the preconditioned air unit in conjunction with the rotunda ventilator. Coordinate controls with the preconditioned air unit manufacturer.
3. Hydraulic Manual Control System for Emergency Use: Each passenger boarding bridge that uses a hydraulic motion or lift control system shall be equipped with a manual control (dead man type) system to permit bridge operation at ground level in the event of a complete control system failure. The controls shall be located in a safe area so the operator has a clear unobstructed view of the aircraft spacer interface, and the passenger boarding bridge will not injure the operator in any way while manually maneuvering the passenger boarding bridge at ground level.
4. Interlocks:
- a. For 40 Hz, cable hoist, water cabinet hoses and PC Air units installed to serve the passenger loading bridge, the units shall be interlocked with the bridge control circuit so that the bridge cannot be moved away from the aircraft while these units are in operation and the cable hoist is not in the full UP position.
- b. Alarms shall be activated in the area of the loading bridge operator console, in the event that the bridge motion controls are activated if either of the above mentioned conditions exist.
- c. It is the responsibility of the Passenger Loading Bridge manufacturer to ensure the compatibility of all bridge controls to be monitored via the Airport System Building Management System (BMS).
- d. The PBB manufacturer must coordinate with the PCA and 400 Hz supplier to monitor all vital functions of operations for each piece of equipment and integrate into the BMS.
- e. Recommended monitoring points will be submitted for review and consideration. Note: The airport reserves the right to change and/or modify each point for monitoring.
- f. The PBB shall interlock and be compatible with the visual Docking Guidance System (VDSS) so as to notify the BDGS System if the PBB is not in a safe position to allow aircraft docking.
- g. General: The control system logic shall preclude damage to circuits or mechanical systems due to simultaneous contrary control signals or an otherwise unsafe control signal combination.
- h. Contrary Control Signal Interlock: All boarding bridge motion shall be precluded whenever contrary control signals (i.e., extend and retract) are activated simultaneously.
- i. Control Console Doors: Provide manually overridable safety interlock switches on all control console doors; upper console, console face and console front door.
- j. Canopy Interlock: Interlock shall prevent all forward or reverse horizontal drive operation when canopy is lowered. All passenger boarding bridge motion, except auto-leveling, shall be possible only when the canopy is in a

- fully retracted position. Provide for a dead man-type mechanical override to permit the retraction only in case of mechanical emergency or bridge failure with the canopy not in the fully retracted position.
- k. Auto-level Interlock: No bridge movement shall be allowed other than that signaled by auto-level operation when bridge is in "AUTO" mode.
 - l. PCA Interlock: Interlock shall prevent horizontal motion when PCA is operating. The control console shall be equipped with flashing light to indicate when PCA is operating.
 - m. 400-Hz Interlock: Interlock shall prevent horizontal drive operation when the 400-Hz unit is engaged or any cable hoist is lowered. The control console shall be equipped with flashing light to indicate when the 400-Hz cable is lowered or the unit is operating when the keyed operator is in "ON" mode.
5. Limit Switches: Electrical limit switches shall be provided on all passenger boarding bridge movement actuator systems, cab spacer and canopy system. These shall include fail-safe proximity limit switches activated near the end of horizontal and vertical travel. These switches shall de-energize their respective actuator systems when contacted.
- a. Bridge extension and retraction: Provide three limit switches, one proximity for slow down, one proximity for stop, and one mechanical for ultimate stop.
 - b. Cab rotation: Provide limit switches to control the extremes of cab rotation.
 - c. Drive wheel: Provide ~~proximity limit switches~~ **mechanical stop** to control oversteer of drive wheels.
 - d. Rotunda rotation: The rotunda shall be equipped with two double throw, double action adjustable limit switches in each direction to control the traversable area of the bridge. If the bridge activates the proximity for stop limit switch, travel in the limited direction shall be disallowed. If the bridge activates the ultimate stop due to failure of the proximity for stop, all power shall be disconnected, stopping the bridge. The limit switch located on the rotunda shall be reset locally by a bypass switch inside the control console.
 - e. Tunnel slope: Provide slope limit switch that allows tunnel slope to be adjusted from 10% slope up to 10% slope down. If limit switch is activated, travel in the directions of increasing slope shall be disallowed.
 - f. Cab Spacer: Provide limit switches mounted one on each end and one at the centerline of the front of the spacer to stop the bridge when the spacer contacts the aircraft.
 - g. Proximity Sensor: Provide proximity sensor to detect when aircraft fuselage is approximately 2 feet away from cab spacer. At this point, the bridge rate of travel shall be slowed to not more than 6 feet per minute. Detection distance shall be adjustable from 0 feet to 6 feet. Sensor shall be rated for outdoor installation.
 - h. 45-degree Sensors: Provide two additional proximity sensors mounted on side of cab at 45-degree angle to activate slow down and stop functions when bridge is approaching aircraft at an angle. Sensors shall be rated for outdoor installation. Distances shall be set per PBB manufacturer's recommendations.

- a. Cab ceiling exterior fluorescent light: Two bulb sealed 48-inch 40W light.
 - b. Cab undercarriage exterior flood lights: Minimum of two, 150W explosion-proof to illuminate apron ahead of PBB.
 - c. Tunnel undercarriage flood light: 150W explosion-proof to illuminate drive column wheel bogey area.
2. Interior Lighting: Provide separate lighting circuits for the apron drive passenger boarding bridges and the fixed walkways. Each shall be controlled independently by three-way switches located at the cab and rotunda and each end of the fixed walkway. Lights shall be placed every eight (8) feet maximum in the boarding bridge and fixed walkway or as otherwise required to meet the required illumination level.
- a. Fixtures: 2 feet by 4 feet recessed with white anodized aluminum finish or approved equal.
 - b. Lamps: Cool white, high output, energy saving fluorescent lights, 3 each fixture.
 - c. Ballast shall be provided for 0°F cold weather rated applications.
 - d. Tunnel: Fixtures and lamps as specified above.
 - e. Rotunda: Fixtures and lamps as specified above.
3. Illumination Level: Intensity of illumination will be measured at the floor.
- a. Tunnel, Fixed Walkway and Cab: 28 foot-candles average.
 - b. Control Panel: 60 foot-candles average. Switched near control panel.
 - c. Emergency Lighting: 5 foot-candle minimum as measured from the floor-level.
4. Emergency lighting ballast shall be provided in the following locations at a minimum to meet the required illumination level when power is lost. The red power indicating light shall be located in the tunnel light fixture.
- a. Rotunda ceiling light.
 - b. "A" tunnel middle and transition ramp.
 - c. "B" tunnel middle and transition ramp.
 - d. "C" tunnel middle and cab.
 - e. Cab external light.
 - f. Emergency lighting ballast shall be provided where needed throughout the length of the fixed walkway to meet the required illumination level when power is lost.
5. Emergency Fluorescent Lamp Power Supply: Provide self-contained battery powered inverter unit for direct mounting in designated fluorescent fixtures. Provide unit with 120Vac input, fully automatic two rate charger, nickel-cadmium battery, automatic low voltage battery disconnect, AC "ON" pilot light, and test switch. Unit shall automatically transfer to battery supply on loss of normal AC power and operate one fluorescent lamp with a minimum output of 1100 lumens for 1-1/2 hours.

6. All lighting fixtures shall have adequate access for lamp replacement and fixture cleaning.
 7. Provide electrical circuit for lighted sign mounted on exterior of cab indicating gate number.
- N. Windows: Provide windows as follows:
1. Cab: Provide clear safety glass to permit operator at control console full view of the aircraft contact area. Provided a wire reinforced safety glass window to the left side of the control station.
 2. Cab roll-up side curtains: Provide two wire-reinforced glass windows in every panel. The windows shall be in the low normal positions on the right side and high normal position on the left side.
- O. Utilities:
1. Telephone Service: The apron drive bridge telescoping tunnels shall be fixed with an under-bridge, 4-pair 22-AWG armored sheath with PVC jacket flex cable telephone service from cab to rotunda. Connect from the boarding bridge to service provided at the exterior terminal wall. Terminate conductors in outlet in cab. An outlet for the installation of telephone equipment shall be provided on left side wall adjacent to the control console approximately 54 inches above the floor. Gate user will provide the phone.
 2. Convenience Outlets: Ground Fault Circuit Interrupter (GFCI) duplex outlets (unswitched 120V, 1 phase, 20 Amp) shall be located as indicated below and shall be supplied by 20A circuit breakers dedicated to receptacles only:
 - a. Terminal end of fixed walkways.
 - b. Every 25 feet of fixed walkway length.
 - c. Rotunda.
 - d. Aircraft end of "A" tunnel.
 - e. Aircraft end of "B" tunnel.
 - f. Left side wall of the cab, adjacent to the operator's control console.
 - g. Drive column wheel carriage crossbeam.
 - h. Roof near lift columns.
 - i. Near rotunda column.
 3. Power: The apron drive bridge telescoping tunnels shall be equipped with an under-bridge cable carrier transport system, for the power transmission cables to the 400-Hz frequency converter, boarding bridge, and preconditioned air unit.
 4. Smoke Detector Alarm Signal: Provide smoke detector with dry contacts to close on alarm and provide #16 AWG, 2-conductor wire across the boarding bridge and fixed walkway to communicate the dry contacts back to a junction box near the terminal wall.
 5. PCA Condensate Return: The apron drive bridge telescoping tunnels shall be equipped with an under-bridge flexible tubing condensate return line with a minimum diameter of 3/4-inch. Provide sufficient tubing length to reach termination points at the rotunda column and connect to the preconditioned air

unit. The bridge manufacturer shall coordinate with the PCA manufacturer regarding locations and connection methods. The condensate return line shall deliver condensate from the PCA unit mounted behind drive wheels to the boarding bridge rotunda column where it will be discharged into an apron-mounted hub drain. Condensate return line shall be capable of "drain-down" for winterization.

2.07 A380 UPPER DECK SERVICE:

- A. Provide features necessary for passenger boarding bridge to serve the upper deck U1 door of the Airbus A380 aircraft where indicated on the Drawings.
- B. Passenger boarding bridge manufacturer shall be responsible for designing and providing all features necessary for the passenger boarding bridge to safely and successfully service the A380 U1 door. Passenger boarding bridges serving the A380 U1 door shall meet all of the requirements of these Specifications and the Drawings, except as otherwise necessary for the passenger boarding bridge manufacturer to provide a safe and successful product. Any features necessary that deviate from these Specifications or the Drawings shall be identified by the Bidder in their Bid Documents.
- C. Features for passenger boarding bridges serving the A380 U1 door shall include, but not be limited to:
 1. Provide infrared proximity sensors including 45-degree sensors in accordance 2.6 I.5, g-i. Upgrade control system as required to accommodate new sensors.
 2. Provide collision avoidance system to prevent collision with adjacent passenger boarding bridges and collision with aircraft, including wing and engines. Provide all equipment necessary for primary and secondary collision avoidance system as described in 2.6, I.6.
 3. Canopy or cab spacer modifications as necessary.
 4. Vertical and horizontal drive modifications as necessary.
 5. Additional video systems as necessary for safe operation.
 6. Provide means to stabilize the bridge, such as outriggers on the wheel bogie.

2.08 ACCESSORIES:

- A. Ventilator: Provide a 3,000 cfm power ventilator installed on the roof of the rotunda for use with bridge precooling/preheating. Ventilator shall be equipped with a back draft damper.
 1. Provide switches in the fan housing and on the console.
 2. Provide smoke detector in cab above the console to automatically shutdown the ventilator in event of a fire and send signal to main building fire alarm system.
- B. Provide tunnel ice scrapers that ride on "A" and "B" tunnels.
- C. Mirrors: Provide two 18-inch circular convex safety mirrors with stainless steel backing. Locate on the left side of the cab to enable the operator to have view of the apron and drive wheels and on service platform railing to allow operator to view the bottom of the service stairs from the control console.
- D. Handrails: Interior tunnel handrails shall be ADA compliant (1-1/4" to 1-1/2" O.D.), mounted at a height of 34" to 38" above floor surface, with a clearance from the

sidewall of 1-1/2" and with return ends. Handrails shall be brushed aluminum. Provide handrails in the following locations:

1. Fixed walkway full length on both sides. Handrails are to be installed continuously including where walls are skewed.
 2. Transition ramp areas, both sides of the tunnel. The handrail shall extend over the transition ramps and shall be sloped at a uniform dimension above the ramp.
 3. Cab and tunnel roof handrails to provide OSHA-approved access to serviceable roof accessible components.
- E. Passenger boarding bridge precooling/preheating grille and duct connection to preconditioned air unit. Grille shall be mounted as far forward (toward cab end of tunnel) as possible in order to allow precooling/preheating with the bridge fully retracted. Coordinate location, size, and other requirements with preconditioned air handling unit manufacturer.
- F. A-Frame: Provide two service A-frame structures suitable to straddle and support the boarding bridge from the ground. It shall be designed to support the weight of the bridge for servicing undercarriage components, and the cab lifting mechanisms. Furnish all cables, chains, and hoists as required to raise/lower the boarding bridge for service. The A-frame shall be delivered prior to Substantial Completion.
- G. Tow Bar: Provide two tow bars designed and constructed to be stored, transported and connected to the boarding bridge undercarriage for towing of a disabled unit. Tow bars shall be configured for connection to a standard height hitch on a pickup truck.
- H. Gate Sign: Provide gate sign mounted on right side of cab, complete with photocell mounted under cab, wiring and circuit overcurrent protection and disconnect. Provide a flat, framed illuminated gate sign for high visibility. The terminal letter and gate numbers shall be 12 inches high each, black on white background. The gate sign shall be highly visible to approaching aircraft from any angle at a distance. The gate sign shall be lighted for visibility at night and 115Vac power shall be provided and connected by boarding bridge manufacturer.

2.09 AUXILIARY SYSTEMS COORDINATION AND PROVISIONS:

- A. 400 Hertz System:
1. The Contractor shall provide all necessary mounting provisions (i.e., drilled holes and any necessary reinforcement) for the 180 kVA, 400Hz point-of-use unit and cable hoists on the side of the PBB.
 2. The Contractor shall coordinate mounting provisions for the 400 Hz power equipment and insure the required mounting provisions are factory installed and finished prior to delivery of the PBB.
 3. The 400 Hz unit size will be rated at 180 kVA and combined with 28.5Vdc Unit where indicated.
 4. The Contractor shall provide structural mechanism and all electrical cables to support and operate 400 Hz/28.5Vdc units on the side of the loading bridge, C Tunnel.
- B. Preconditioned Air System (PCA):
1. The Contractor shall provide all required mounting provisions (i.e., drilled holes and any necessary reinforcement) for the PCA air handling unit, air duct, hose

basket, bridge pre-conditioning grilles and duct, thermostats, and switches and provide a 3000 cfm rooftop ventilator unit mounted on the roof of the rotunda. The PC Air unit shall be bridge-mounted on a support frame.

2. Control wires from a terminal box under the cab near the lift column to a terminal box on the face of the rotunda rigid frame shall be factory installed. Control wires shall include two (2), twisted shielded pairs, #18 AWG and 20 #18 insulated conductors suitable for 24Vac or DC, all rated and routed as Class II control wiring.
 3. The cabin temperature sensor wall plate in the bridge cab shall be factory installed.
 4. Mounting provisions for all PCA equipment shall be factory installed and finished prior to delivery of the PBB.
 5. The Contractor shall provide structural mechanism and all electrical cables to support and operate PCA units.
- C. Existing Gate F3 Collision avoidance system:
1. Provide collision avoidance system on the existing F3 PBB to prevent collision with adjacent PBB and collision with aircraft, including wings and engine. Provide all equipment and controls upgrades necessary.
 2. Provide infrared proximity sensors including 45-degree sensors. Upgrade existing bridge control system as required to accommodate new sensors.

2.10 FINISHES:

- A. All interior and exterior surfaces shall be protected and free of corrosion.
- B. Exterior Paint System: All exterior steel surfaces shall be protected from corrosion by the following.
1. Surface Preparation: Contaminants shall be removed from surfaces in accordance with SSPC-SP1 (Solvent Cleaning) requirements and commentaries. Exterior steel surfaces shall be dry abrasive blast cleaned in accordance with SSPC-SP6 (Commercial Blast Cleaning) at 1.5-2.0 mils profile depth. All sand, grit and dust shall be blown free of all surfaces and crevices prior to painting.
 2. First Coat: Chromate-free epoxy primer, total dry film thickness of 5 mils over the entire surface.
 3. Second Coat: Catalyzed polyurethane enamel, total dry film thickness 2 mils minimum.
 4. Third Coat: Catalyzed polyurethane enamel, total dry film thickness 2 mils minimum. Color in accordance with list below.
 5. Total exterior dry film thickness: Nine (9) mils minimum.
- C. Exposed Interior Paint System:
1. Surface Preparation: Contaminants shall be removed from surfaces in accordance with SSPC-SP1 (Solvent Cleaning) requirements and commentaries. Exposed interior steel surfaces shall be cleaned in accordance with SSPC-SP3 (Power Tool Cleaning) at 1-3 mils profile depth. The cab surface shall be dry abrasive blast cleaned in accordance with SSPC-SP6 (Commercial Blast Cleaning) at 1-3 mils profile depth.

2. First Coat: Chromate-free epoxy primer, total dry film thickness of 5 mils over the entire surface.
 3. Finish Coat: Catalyzed polyurethane enamel, total dry film thickness of 3 mils minimum. Color in accordance with list below.
 4. Total interior dry film thickness: Eight (8) mils minimum.
- D. Non-Exposed Interior Paint System:
1. Surface Preparation: Contaminants shall be removed from surfaces in accordance with SSPC-SP1 (Solvent Cleaning) requirements and commentaries. The minimum surface preparation for all non-exposed interior surfaces shall be in accordance with SSPC-SP3 (Power Tool Cleaning) at 1-3 mils profile depth.
 2. Primer Coat: Rust inhibitive chromate free primer, total dry film thickness of 1-2 mils over the entire surface.
- E. Exterior colors and finishes shall be as follows:
1. Tunnels, cab, top, sides, underside: Custom color as selected by Architect (likely silver or light gray).
 2. Cab curtain side covers: Custom color as selected by Architect.
 3. Service stairs and landing: Galvanized steel.
 4. Upper lift column section, inner and outer tubes, lower drive column section and rotunda support column below the bearing: Custom color as selected by Architect.
 5. Aircraft closure hood & side skirts: Custom color as selected by Architect.
 6. Cab area forward of the cab doors, actuator covers and the outside door face: Manufacturer's standard cover.
- F. Interior colors and finishes shall be as follows:
1. Wall trim: Aluminum/black centers if applicable.
 2. Tunnel end trim: Custom color as selected by Architect.
 3. Ceiling to wall trim: Black.
 4. Kick plate: Black.
 5. "B" and "C" Tunnel Rain Gutters: Aluminum.
 6. Carpet molding: Aluminum.
 7. Cab and bubble floor: Black ribbed rubber.
 8. Ceilings: White.
 9. Rotunda & cab walls: Custom color as selected by Architect.
 10. ~~Rotunda and cab galvanized curtains shall not be painted.~~
 11. Carpet: Purchased by PBB manufacturer, installed in plant. Custom Atlanta DOA logo carpet, color to be selected by Architect. See attached data sheets for approved manufacturers' of logo carpet.
 12. Interior Tunnel Walls:

- a. Interior wall treatment shall consist of steel or aluminum panels or 7/16-inch (minimum) wall panels laminated on both sides to prevent bowing, four feet on centers with aluminum trim and recessed black accept strips. Provide water drain holes in the bottom J-channel.
13. Interior Floor:
- a. Tunnels and rotunda floors shall be constructed of minimum 3/4-inch marine grade plywood A-B, seven-ply minimum or galvanized steel.
 - b. The cab bubble area floor shall be constructed of 3/4-inch minimum marine grade plywood A-B, seven-ply minimum with outside edges sealed with fiberglass resin, or galvanized steel.
 - c. The exterior cab floor shall be constructed of aluminum or galvanized steel.
 - d. Transition ramps shall be constructed of 1-1/8-inch marine grade plywood A-B or galvanized steel. Transition ramps shall be hinged. "A" tunnel ramp shall be full width of tunnel. Nosing on ramps shall have abrasive anti-skid aluminum surface. Ramps shall not cut or mark the tunnel floor the ramp is riding over. Ramps shall be covered with 1/4-inch ribbed fire-resistant black rubber with anti-skid surface and yellow chamfered edge.
 - e. Tunnels and rotunda floors, except as noted, shall be carpeted. Carpet shall be supplied by the Contractor and factory installed by boarding bridge manufacturer. Provide 1-1/2-inch wide carpet bar screwed into the floor between carpet and ribbed rubber in the cab.
 - f. Cab Floor Finish: One-quarter inch ribbed fire-resistant black rubber with anti-skid surface shall be installed from terminal side of service door to the aircraft spacer assembly. Rain gutter ends, door threshold and rubber matting seams shall be sealed with black silicone. Ribs shall be oriented perpendicular to tunnel centerline.
14. Architectural Metal and Trim Items: Anodized aluminum or stainless steel with satin finish.
15. Paints and carpet adhesives shall have a maximum VOC of 3.5 lbs./gal for field applied applications or as otherwise limited by local regulations. Stated VOC shall be unthinned maximum as certified by the manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. The Contract Documents do not indicate the location of each aircraft position at each gate. The Contractor shall be responsible for verifying all locations of aircraft positions for the aircraft indicated on the Aircraft Gate Usage Schedules and advise the Owner's Representative of any conflict or code violations prior to beginning the fabrication of the passenger boarding bridges. Any modification to the Documents as necessary to eliminate conflicts or code violations will be made by the Owner's Representative.
2. Verify the exact Terminal Building door sill and bridge and fixed walkway foundation elevation, and foundation bolt condition, size, and patterns, and all dimensions at each gate prior to fabrication and installation.

3. Verify apron elevations at each bridge and fixed section location. Coordinate these elevations with the bridge operation requirements, layout and maximum slope.
4. Notify the Owner's Representative of any discrepancies with Contract Documents, passenger boarding bridge, or fixed walkway requirements.

B. Pre-Installation Conference:

1. Before commencing passenger boarding bridge installation, conduct a pre-installation conference at the Project Site with the passenger board bridge system manufacturer, installer, Owner's Representative, and other interested parties to review procedures, schedules, and coordination of the passenger boarding bridge and fixed walkway installation with other elements of the Work.

3.02 INSTALLATION

A. Structural Support Elements:

1. All anchor bolts shall be protected from bending and damage during construction. Provide anchor and leveling nuts. Nuts shall meet the requirements of ASTM A449 and shall be galvanized. All zinc coating damaged shall be cleaned and repaired with galvanizing repair primer meeting the requirements of Federal Specification TT-P-641 G (1), Type II.
2. An approved non-shrink grout shall be used underneath the column base plate and leveling-plate. Grout shall be a no-iron mix to avoid rust marks. Grouting of the rotunda base plate shall be formed and poured using the holes in the base plate. Grouting by dry packing and filling the center area with bags and blocks will not be acceptable. The grouting shall be done to American Concrete Institute or structural standards and as approved by the Owner's Representative.
 - a. Grout shall be 3 inches minimum and 7 inches maximum, and within grout manufacturer's recommended thickness range.
 - b. Setting of rotunda requires a leveling nut and washer on each anchor bolt on the underside of the rotunda or fixed walkway base plate and two nuts and one washer on the top.

3. Carpet Installation:

- a. Prior to installation, verify with the Owner's Representative all edging techniques, lines of demarcation between carpeted and hard surfaced floor and wall areas, and treatment at doors and thresholds.
- b. Install the carpet by direct glue down method, free of wrinkles. Adhesive and primer shall be compatible.
- c. Install edge strips where carpeting abuts other flooring including door openings where thresholds are not indicated. Secure edge strips with countersunk flat head stainless steel screws at 12 inches o.c. maximum.
- d. Finished appearance shall be smooth, level, free from misalignment, neatly cut and closely fitted at projections and openings, with joints as close and inconspicuous as possible.
- e. Remove spots immediately with cleaner or solvent recommended by carpet manufacturer.

- f. Vacuum the carpet and cover with non-staining, protective materials.
- g. After the carpet installation is complete, clean all drains, gutters and rain diverters to remove any excess material, construction debris and carpet cutouts, to provide an unobstructed free flowing drainage system.

3.03 FIELD QUALITY CONTROL

- A. Tests: Perform all Field Performance Tests as required by NFPA 415 and to meet the requirements of SECTION 01810 - COMMISSIONING.
- B. Inspection:
 - 1. Preliminary Inspection:
 - a. Manufacturer's representative shall perform a functional inspection and demonstration of each PBB at the installation site in the presence of the Owner's Representative.
 - b. Verification of compliance with this Specification shall be accomplished by inspection, review of data, demonstration, testing, or combination of these.
 - c. PBB shall operate smoothly and quietly. Any jerking or noise shall be remedied by PBB adjustment and/or lubrication as recommended by the manufacturer.
 - 2. Final Acceptance Inspection:
 - a. Owner's Representative Commissioning Agent shall perform the final system verification testing and inspection of the PBBs after full compliance by the Installing Contractor and manufacturer of all outstanding punch list items as determined from the preliminary inspection and meeting the requirements of SECTION 018100 - COMMISSIONING.
 - b. Full acceptance of the unit shall be made in writing to the Contractor after satisfactory completion of all punch list items as determined by the Owner's Representative and Commissioning Agent.
- C. Manufacturer's Field Services:
 - 1. Provide qualified manufacturer's technical representative and service personnel during the entire installation of the boarding bridge to assure a proper installation, and to ensure adequate and reliable field service support to correct any and all equipment failures that may occur during the initial operating period. This representation shall be available to the Owner's Representative at no charge for the first 60 days after installation. The manufacturer's field service representative shall ensure the installer follows:
 - a. The manufacturer's field installation manual.
 - b. Compliance with all safety requirements.
 - c. Accurate and complete reports and records maintenance.
 - d. Latest service bulletins.

3.04 DEMONSTRATION

A. Training Requirements:

1. The Contractor shall conduct training utilizing prepared texts, slides, actual boarding bridges, and other instructional aids as appropriate.
2. Provide a minimum ~~forty (40)~~ **twelve (12)** hours of operator and ~~forty (40)~~ **sixteen (16)** hours of maintenance training by a qualified manufacturer's representative for the boarding bridges purchased under this Contract. ~~Each type of~~ Training shall be divided into at least 5 separate sessions.
 - a. Training shall be conducted at the installation site and in classrooms as designated and provided by the Owner's Representative.
 - b. Maintenance training shall include proper demonstration of cut-away models of critical parts, full instruction of proper maintenance and trouble shooting, and instructions on proper use of manuals. Operator training shall include proper demonstration as well as actual use of correct bridge operations to avoid damaging the equipment by improper use of the controls.
 - c. Training dates shall be mutually agreed upon by the Contractor and the Owner's Representative and shall be at dates prior to scheduled commercial service of the boarding bridges.
3. The Owner's Representative will assign the individuals and/or companies to be trained.
4. Provide six (6) sets of DVDs of complete video recorded training sessions conducted for this Project.
5. Training shall be accomplished in accordance with Closeout Procedures, SECTION 017700.

END OF SECTION 347713